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The WORLD FOOD BUDGET 1970

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FOREIGN AGRICULTURAL ECONOMIC REPORT NO. 19

U.S. DEPARTMENT OF AGRICULTURE
Economic Research Service
Foreign Regional Analysis Division

FOREWORD

The World Food Budget, 1962 and 1966

Research on the World Food Budget was initiated in February 1961 by the Foreign Regional Analysis Division, at the request of the Secretary of Agriculture, as the first step in a program to expand consumption of agricultural products abroad and to help provide an adequate diet for the world's people. The World Food Budget, 1962 and 1966, was published in October 1961.

This study provided a comprehensive summary of world food needs and helped guide U.S. agricultural operations, including export activities under the Food for Peace Program. It highlighted the opportunity for using food abundance in helping build self-sustaining economies in less developed countries. It was also helpful in planning market development programs to expand commercial markets for U.S. farm products.

The World Food Budget, 1970

The World Food Budget, 1970, presents the results of an expanded effort by the Foreign Regional Analysis Division to study the supply and utilization of food commodities for the countries of the world, assess world food needs, and evaluate the problems and possibilities of closing the food gap.

The statistical base for the World Food Budget has been improved considerably. Food balances have been prepared for 92 countries for two 3-year periods, 1956-58 and 1959-61. To improve the accuracy of these food balances, special studies were made in 15 of the countries where supply and utilization statistics were inadequate.

Comprehensive studies to evaluate the supply of and demand for agricultural products and make projections for 1970 and 1975 are completed or underway in 28 countries, representing the major markets and competitors of the United States for farm products. The

completed studies were very useful in making projections for the World Food Budget to 1970.

Agricultural Attaches of the Foreign Agricultural Service, U.S. Department of Agriculture, Rural Development Officers and Food for Peace Officers of the Agency for International Development, and Economic Officers of U.S. Department of State Missions at foreign posts reviewed most of the 1970 projections and provided many useful suggestions. FAS commodity specialists also reviewed the 1970 projections. The food balance for 1959-61 and projections for 1970 for the United States were prepared in the Economic and Statistical Analysis Division of the Economic Research Service. Nutritional reference standards were developed by the Consumer and Food Economics Research Division of the Agricultural Research Service.

The World Food Budget, 1970, was prepared under the direction of Quentin M. West, Deputy Director of the Foreign Regional Analysis Division. Most members of the Division participated in the study. Primarily engaged were Charles A. Gibbons, Glenn R. Samson, William L. Davis, Ronald E. Kampe, James F. Keefer, James J. Naive, Sheldon Tsu, George W. Coffman, Mary S. Coyner, Ray S. Fox, Gerald L. Schmaedick, Robert E. Shepherd and Edith C. Allen.

It is planned to prepare a World Food Budget about every 5 years. There is need for improvement of the data for many of the country food balances, and this work will progress in the years ahead. Food consumption surveys are planned in several countries, particularly those where sizable segments of the population are believed to have diets substantially below the average for the country.


Wilhelm Anderson, Director

Foreign Regional Analysis Division

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HIGHLIGHTS

Two-thirds of the world's people live in countries with nutritionally inadequate national average diets. The diet-deficit areas include all of Asia except Japan and Israel, all but the southern tip of Africa, the northern part of South America, and almost all of Central America and the Caribbean.

The diet of people in these areas averaged 900 calories per day below the level of the one-third of the world living in countries with adequate national average diets in 1959-61, and 300 calories below the average nutritional standard for the diet-deficit areas. The daily consumption of protein was less than two-thirds of the level in the diet-adequate countries; the fat consumption rate was less than one-third.

Some progress is expected in the diet-deficit area during the rest of this decade. The calorie level by 1970 is expected to be 8 percent above the base period (1959-61). Consumption of protein and fat is expected to be up 10 and 16 percent, respectively. This indicates an improvement not only in the quantity of food per person but also an improvement in quality.

However, a food deficit will still exist in 1970. The expected calorie gap will be the equivalent of 54 million metric tons of grain. The deficit in animal protein will likely be equivalent to 6.5 million tons of nonfat dry milk. About 3.2 million tons of soygrits would be required to fill the pulse and other protein deficit. And 3.1 million tons of vegetable oil would be needed to satisfy the fat deficit.

The total cost of the food deficit in 1970 is projected to be \$6.8 billion. This amount would be about one-third below the cost of the food deficit during the base period, 1959-61. About 93 percent of the deficit is accounted for by countries in the Far East; Communist Asia alone is responsible for 62 percent.

The distribution of the deficit among the subregions with inadequate diets and the deficits per capita are as follows:

<u>Subregion</u>	Share of deficit	Deficit per capita
	<u>Pct.</u>	<u>Dol.</u>
Central America and Caribbean	1.3	2.10
South America (excl. Brazil, Argentina, and Uruguay)	1.0	1.05
North Africa	1.0	0.64
West Central Africa	2.1	1.07
East Africa	0.3	0.27
West Asia	1.7	1.17
India	13.2	1.69
Cther South Asia	5.0	2.07
East Asia (excl. Japan)	12.0	2.61
Communist Asia	62.4	5.04

The diet-deficit countries are poor and food deficiencies merely reflect the low level of living in general. Per capita income in the base period was only \$97 compared to \$1,074 in the diet-adequate countries. Although economic development is taking place, it is to a large extent offset by increases in population. These countries are already densely populated--53 persons per 100 acres of agricultural land compared to 17 persons per 100 acres in the diet-adequate countries. And the population is increasing at a rapid rate of 2.1 percent annually, compared to 1.3 percent in the adequate areas.

The basic problem of the diet-deficit countries is one of productivity. The people cannot produce enough food to feed themselves or produce enough other products to afford to buy the food they require. Food production has

barely been able to keep ahead of population growth, much less provide for the expanded demand resulting from some improvement in per capita income, most of which goes for food. Per capita food production increased annually only 0.32 percent since the prewar period (excluding Communist Asia), and it is expected to increase over the decade of the 1960's at about the same rate. There will be increasing pressure upon the food supply but at rising levels of consumption.

Much of the modest improvement in per capita food consumption results from changes in trade patterns. The net grain trade position of the deficit areas has reversed--from 2.8 million metric tons for export, prewar, to an expected 27 million tons to be imported in 1970. Still, the level of food imports is very meager in the diet-deficit areas. It amounts to only about \$1.66 per capita compared to almost \$12 per capita in the diet-adequate areas.

Food aid accounts for a large part of the food imports into diet-deficit countries. These countries imported \$3.2 billion worth of food in 1959-61. Close to one-third of this came from the United States under concessional programs. Food aid will likely continue to make important contributions to diet improvement as well as economic development. However, considering the size of the nutritional gap, the limitations of expanding food aid, and the chronic balance-of-payments problems in most less developed countries, the food gap will eventually have to be filled largely within each country itself.

This is a formidable task. Over most of the world's history, the amount of agricultural land has increased with population. In the densely populated diet-deficit countries, new lands are no longer available at a reasonable cost, so agricultural development requires improvement in yields per acre. This is difficult to accomplish when the labor force is

largely illiterate and lacking in capital and the technical and managerial skills necessary for adopting modern cultivation methods. The task is made even greater by the necessity of providing capital not only for agriculture but also for a rapidly growing nonagricultural sector and urban population.

There is a vast reservoir of knowledge in the developed countries which, if properly adapted to the specific conditions of the deficit countries, could go a long way towards increasing the output of food. But the problem is the gap separating the existing body of known technology from its application. Improved technology has been applied in only a small part of the world, but this does not mean that it cannot take place in other parts of the world. Nor should it require the same amount of time.

The diet-adequate subregions have assured the food supply for a billion people. In addition to assuring their own food supply for the foreseeable future, in the past decade they have been able to send food assistance to many of the less developed regions. They operate the agricultural land more intensively; they allocate substantial resources for education, research, and development; and they provide facilities and services for agriculture. This means greatly increased yields per acre, greater output per unit of livestock, and increased output per hour of labor.

Expanding population, economic development, and improvement in diets will result in a significant increase in world food trade during the 1960's. Exports of food are expected to increase 37 percent to \$22 billion annually by 1970. The United States will share in this increase; food exports from the United States are expected to increase 50 percent above the base period to \$4.8 billion by 1970. An increasing proportion of these exports will go to the diet-deficit subregions and will play an important role in upgrading their diets.

THE WORLD FOOD BUDGET, 1970

INTRODUCTION

The World Food Budget measures the requirement for food in the future against the availability of food. In a sense, it is a world balance sheet of input and outgo of food commodities.

It is based upon food balances recently completed for 92 countries--covering 94 percent of the world's population--for two 3-year periods, 1956-58 and 1959-61. Entire food balances for these countries are projected to 1970, and estimates of production and consumption are made for areas not covered by food balances. Consumption projections are based on population growth and, where information is available, reflect the effect of changes in income. Price effects are considered where known trends exist and subjectively in balancing supply and demand in each country. Production projections are based primarily on trends, which are adjusted in accordance with an analysis of country development plans. Food imports, exports, and nonfood uses are also projected in each country food balance.

The country food balances are summarized into 10 food groups and 22 subregions of the world. ^{1/} The summary food balances are measured against nutritional requirements, and world food deficits are estimated. These deficits are expressed in terms of specific commodities to obtain a realistic measure of

their magnitude. Changes from 1959-61 to 1970 are analyzed, as well as problems related to improving diets in the less developed countries. Implications of projected world food requirements for U.S. food trade and aid are discussed.

Food Deficits

Since one of the principal purposes of this study is to determine where food deficits exist, it is well to define exactly the deficit being measured. The country food balances summarize food supplies and uses at the national level. Food availabilities per capita per day are then translated into calorie, protein, and fat content. This gives nutrient levels of the national average diet of the country. This national average is then compared with regional nutritional reference standards that represent minimum physiological requirements for normal activity and health, plus 10 to 12 percent allowance for waste between the retail level and consumption. Where the national average diet falls below these standards, there is considered to be a nutritional deficiency in the country. It is this food deficit which this study measures.

This, of course, does not mean that all people in a diet-deficit country have inadequate diets; a large number will have satisfactory levels of consumption. This study does not attempt to measure the proportion of the population of a diet-deficit country which suffers from undernutrition or malnutrition.

This study also does not measure the nutritional deficit within a country which is

^{1/} Definitions of the subregions and food groups, methodology, and summary food balances by subregions are in the Appendix. The individual country food balances for 1970 are mimeographed as regional supplements to this publication; a limited supply is available for research workers.

diet-adequate. Obviously, a large part of the population falls below the average level of diets. In some countries there may even be identifiable geographic regions, ethnic groups of population, or income groups which are substantially below the national average level. Even in the United States there are pockets of poverty where diets are not nutritionally adequate. It is anticipated that as techniques and knowledge improve we will be able to separate out some of these population groups with substandard diets and identify more fully the nutritional food deficit of the world.

The reference standard diet is in some respects below what may be considered a desirable diet. The Food and Agriculture Organization of the United Nations has set up short-term and long-term targets to improve diets beyond a minimum standard. As developing nations advance economically, rising incomes and levels of living bring about greater demands for food than minimum nutritional needs. In many rapidly developing countries this increased demand may sharply outrun increases in agricultural production. Demand for food may also increase faster than the ability of the country to import food on a commercial basis. This food deficit may be regarded as an economic or growth deficit and it may be even greater in some countries than the amount needed to raise diets to minimum nutritional levels. Such an economic food deficit is not measured in this study.

Assumptions

Projections of country food balances to 1970 were based on the following basic assumptions:

1. Normal weather (which is probably more favorable than a statistical average).

2. No large-scale war, but defense expenditures in the most important countries at current ratios to national income.

3. Political stability in most countries, with policies fostering agricultural development.

4. Maintenance of near-full employment in the industrial countries, acceleration of economic development in underdeveloped countries, and a continued growth in real per capita income in most areas.

5. No major inflation on a world scale, but general price levels trending upward.

6. Population growth as estimated by ERS, based on recent work by the U.S. Bureau of the Census, the United Nations, and others.

7. Continuation of present policy of agricultural protection in importing countries.

8. No substantial change in price relationships among products within a country or on a world level. 2/

9. Export supplies from the United States to be available at competitive prices.

10. No change in U.S. policy on food aid.

These assumptions indicate an optimistic outlook on the world economic and political situation. Country projections take into consideration different rates of economic growth or retardation. However, this study does not predict where economic, political, or climatic reversals may occur.

2/ An exception is that grain prices are assumed to begin converging in the Common Market, but not to reach convergence by 1970

WORLD FOOD REQUIREMENTS

Consumption Patterns, 1959-61

Most of the world's population still relies upon high carbohydrate foods--grains, sugar, roots, tubers, and plantains--for a high percentage of its diet. Grains continue to be the major food staple group. In the Far East, which accounts for well over half of the world's population, grains provide over two-thirds of the total energy on calorie value of the diet. The people of North Africa, West Asia, and East Europe acquire over half of their calories from grains. The outstanding example of dependency on grain is Communist Asia, where food grains account for nearly 75 percent of total calorie consumption. Of all subregions, the United States is the least dependent directly upon grains.

Rice and wheat are the dominant foods. In the Far East, the major rice producing and consuming region, rice accounts for 42 percent of total calorie consumption. The consumption of wheat varies greatly among the subregions, from a low 1.2 percent of the calories for West Central Africa to a high of 48 percent for West Asia. Other subregions relying fairly heavily upon wheat include the River Plate countries, Southern Europe, and USSR.

The consumption of other starchy crops, such as cassava, potatoes, sweetpotatoes, and plantains, varies much more widely than food grains. Such crops are most important in West Central Africa, where they account for over 45 percent of calorie intake.

Consumption of pulses and nuts is relatively unimportant in most of the world. The proportion of total calories ranges from a high of over 13 percent in India, where utilization of animal products is the lowest, and pulse protein must substitute for animal protein, to a low of 1 percent in the River Plate countries.

A high level of sugar consumption is prevalent in the Western Hemisphere and in Oceania. Consumption ranges from a high of over 16 percent of total calorie intake in Canada to a low of 1.2 percent in Communist Asia.

The high protein, low carbohydrate food groups of meat, fish and eggs, and milk products (excluding butter) account for a minor part of total protein as well as calorie consumption in most of the world. The animal protein foods contribute less than 10 percent of the total calorie value and only one-fourth of the protein content of the food supply in countries with over 64 percent of the world's population. Consumption of these foods is lowest in Communist Asia and West Central Africa and highest in Oceania. Little milk and cheese are consumed in Japan, East Asia, Communist Asia, West Central Africa, and East Africa.

Fruits and vegetables, another high quality but low-calorie food group, contribute a small percentage to the energy value of the food supply of all subregions. Their share in total calories ranges from a high of 7.5 percent in West Asia and Southern Europe to a low of less than 1 percent in East Africa.

Even the high-calorie fats and oils provide only a small share of the energy value of the diet in many less developed countries. In East Africa and Communist Asia, this share amounts to little more than 3 percent. In the United States, in contrast, the share of fats and oils exceeds 20 percent of total calorie consumption, and it ranges between 11 and 18 percent in the three European subregions, Canada, Oceania, and the River Plate. These subregions account for most of the butter and lard consumed in the world. In nearly all the less developed countries, vegetable oils lead among the visible fats eaten by the population.

Table 1.--Calorie levels per capita and percentage of calories from food groups by subregion in ascending order of percent of calories from high carbohydrate foods, average 1959-61 ^{1/}

Subregion	Calorie level	High carbohydrate foods	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
	Number											
United States.....	3,190	40	17.4	0.9	2.5	3.1	3.3	15.7	6.2	20.5	16.9	13.5
Canada.....	3,100	42	18.8	0.6	1.9	4.5	1.9	16.3	4.8	15.1	22.0	14.1
Oceania.....	3,260	43	25.2	0.6	1.3	2.7	1.3	13.4	4.7	14.3	24.8	11.7
Northern Europe.....	3,060	48	23.4	0.6	4.0	6.9	1.7	13.4	4.5	17.8	16.4	11.3
River Plate.....	3,200	56	33.2	1.7	2.3	6.0	1.0	12.4	3.3	12.5	21.0	6.6
Southern Europe.....	2,720	60	40.1	2.4	3.8	6.0	4.4	7.6	7.4	15.6	6.9	5.8
Eastern Europe.....	3,000	66	32.1	1.0	16.5	7.8	1.3	8.5	2.9	11.4	11.9	6.6
Central America.....												
and Caribbean.....	2,240	69	8.8	9.4	23.0	12.7	5.9	15.0	4.2	8.6	7.4	5.0
Mexico.....	2,580	70	11.1	1.6	42.2	1.8	8.0	13.0	2.8	8.1	6.1	5.3
Other South America...	2,260	70	16.9	5.9	16.0	15.5	3.9	15.9	3.9	7.5	9.0	5.5
Brazil.....	2,710	71	8.6	14.5	11.2	20.9	8.9	15.4	2.3	5.9	8.4	3.9
Southern Africa.....	2,670	72	14.0	1.1	41.6	1.1	1.7	14.0	2.4	5.3	12.4	6.4
West Asia.....	2,350	72	48.0	4.2	8.8	1.6	4.1	9.4	7.6	8.1	4.0	4.2
USSR.....	3,040	73	35.7	0.8	16.9	9.9	1.4	9.8	1.9	8.9	8.1	6.6
North Africa.....	2,210	73	26.4	3.1	36.2	1.3	5.7	6.1	6.1	6.0	4.3	4.8
India.....	2,060	74	11.3	33.1	19.0	2.6	13.2	8.2	2.0	4.2	0.9	5.5
Japan.....	2,360	78	11.7	46.9	4.6	7.7	5.9	6.7	4.2	5.0	5.9	1.4
Other East Asia.....	2,150	78	1.8	50.1	7.7	12.7	6.6	5.2	5.4	5.7	4.1	0.7
Other South Asia.....	2,120	79	19.4	47.1	4.9	1.0	5.9	6.7	3.6	4.0	3.0	4.4
West Central Africa...	2,460	81	1.2	5.7	27.2	45.3	6.5	1.5	1.0	9.0	2.0	0.6
East Africa.....	2,390	83	2.3	8.4	55.9	12.4	6.5	4.3	0.8	3.4	3.6	2.4
Communist Asia.....	1,790	87	12.2	44.3	18.1	11.1	5.9	1.2	1.7	3.1	2.3	0.1

^{1/} See Appendix for definition of food groups.

Projected Food Requirements, 1970

Per Capita Consumption

For the world, per capita consumption of food is expected to make noticeable gains during the 1960 decade, reflecting an increase not only in calorie intake but also an upgrading of the diet through greater consumption of foods such as meat, dairy products, fruits, and vegetables.

Greatest diet improvements are indicated for the countries of Northern Europe, Southern Europe, USSR, and Japan. Most of these countries are experiencing rapid rises in income per capita and, though diets are adequate, significant changes are expected in the composition of their diets, reflecting less reliance upon the traditional food staples. Nevertheless, about 80 percent of the world's population will still be dependent upon high carbohydrate foods for over two-thirds of their total calorie consumption. In these countries, rapid increases in population, consistently low incomes, and continued failure of agricultural production to reach programmed goals give promise of but little improvement in per capita consumption by 1970.

World consumption per capita is projected to increase for all but 3 of the food groups--wheat, other grains, and other starchy crops. However, substantial increases are indicated for the high carbohydrate food groups in the less developed subregions. There, consumption of rice and wheat is expected to advance most rapidly, reflecting continued reliance upon these basic food staples for the major source of food. On the other hand, consumption per capita is projected to decrease in the more developed subregions for all the high carbohydrate foods, except sugar. Even so, the increase in rice offsets the decrease in other grains so that there is some increase in per capita consumption of total grain products.

The greatest increases in per capita consumption are projected for the high quality foods, reflecting a continued upgrading of the diet in most parts of the world. Vegetables and fruits were up as much as 16 percent over the 1959-61 level. Significant but smaller advances are projected for meat, fish, and eggs, particularly in Southern Europe and Japan where the expected living standards will increase the effective demand for the more expensive foods. Projected increases in world consumption of fruits and vegetables and animal products are strongly influenced by the extremely low level to which consumption of these products in Communist Asia had fallen in 1959-61. Recovery to a more normal level is expected by 1970.

Trends in consumption patterns during the decade of the 1960's can be observed more closely by expressing kilograms of food consumed in terms of total calories, the share of calories from high carbohydrate foods, grams of proteins, and grams of fat, as is done in table 3.

Four subregions are projected to have 1970 diets that draw less than one-half of their calorie value from high carbohydrate foods. These subregions account for less than 15 percent of the world's population and their ranking among the subregions, in terms of these foods, is not expected to change by 1970. Per capita calorie level is very high but is moving downward in 3 subregions. Daily consumption of protein and fat is above 90 and 140 grams per capita, respectively. This reflects a decrease in consumption per capita of all grains and a significant rise in consumption per capita of the high quality foods.

Northern Europe is projected to upgrade its diet substantially. This area has a low population growth rate and one of the highest

Table 2.--Consumption per capita per year of foods by subregion, average 1959-61 and projected 1970 1/

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
----- Kilograms -----										
<u>Western Hemisphere</u>										
United States										
1959-61	75.1	3.9	25.5	45.7	9.8	47.2	137.5	22.2	114.2	229.9
1970	69.7	4.5	27.0	45.7	9.7	47.3	135.7	22.5	123.8	214.4
Canada										
1959-61	84.9	2.8	10.6	72.2	5.1	53.6	138.8	21.8	110.5	191.9
1970	77.2	2.5	9.1	63.7	4.8	53.1	140.6	22.0	116.0	183.0
Mexico										
1959-61	35.8	6.4	120.3	21.6	22.5	34.1	71.9	8.7	27.9	73.3
1970	36.9	6.4	122.5	22.0	22.7	36.3	75.3	8.9	28.5	78.1
Central America and Caribbean										
1959-61	28.0	39.4	55.0	120.8	16.0	29.6	90.8	8.2	29.5	53.4
1970	27.9	37.2	57.4	122.2	16.6	36.2	92.8	7.8	30.1	54.4
Brazil										
1959-61	30.5	58.8	33.8	235.1	28.4	41.9	66.4	7.0	36.6	63.7
1970	32.3	60.6	38.4	239.3	30.3	43.8	74.3	8.5	40.2	65.8
River Plate										
1959-61	147.4	7.8	12.9	91.5	3.2	40.0	120.3	17.1	110.4	101.7
1970	142.4	7.9	12.5	91.6	3.3	39.4	127.5	18.8	112.6	92.2
Other South America										
1959-61	49.4	23.5	41.2	155.7	9.4	37.9	86.9	7.1	38.4	57.4
1970	50.4	25.1	43.1	165.0	10.2	39.6	95.4	8.0	46.0	62.7
<u>Europe</u>										
Northern Europe										
1959-61	97.1	3.0	17.3	110.0	5.6	42.7	134.3	22.3	87.4	217.1
1970	82.5	3.0	12.9	98.7	5.6	44.6	154.5	24.0	102.0	206.9
Southern Europe										
1959-61	147.4	10.1	13.7	77.5	13.5	21.1	217.4	17.5	47.0	116.9
1970	130.8	11.0	12.0	76.7	13.4	25.7	249.8	20.9	65.0	135.7
Eastern Europe										
1959-61	128.7	4.5	67.0	129.0	3.9	26.1	106.9	15.9	52.7	92.2
1970	138.9	5.2	50.2	124.0	4.6	30.6	125.6	17.4	56.5	94.2
USSR										
1959-61	141.8	3.8	64.2	156.6	4.5	30.3	77.2	12.2	55.6	109.6
1970	139.8	3.8	56.0	130.8	4.5	42.1	107.5	15.9	65.4	140.2
<u>Africa and West Asia</u>										
North Africa										
1959-61	70.9	10.2	94.0	12.8	12.7	14.9	81.5	6.2	20.9	60.9
1970	76.5	12.0	96.9	12.5	13.4	17.3	88.2	7.2	23.2	64.5
West Central Africa										
1959-61	4.2	21.3	76.7	426.4	13.7	3.9	32.1	9.1	14.6	7.7
1970	5.8	22.6	79.6	424.9	15.0	5.8	34.5	9.3	16.6	8.5
East Africa										
1959-61	7.2	31.3	145.4	114.9	14.1	9.5	24.5	3.5	22.3	42.4
1970	10.9	32.3	151.4	105.8	17.2	12.4	25.6	3.8	25.9	37.7
Southern Africa										
1959-61	48.7	4.5	119.6	14.6	4.5	38.4	71.2	6.4	58.5	90.4
1970	58.3	4.9	119.7	15.0	5.1	41.6	71.9	6.7	62.9	94.2
West Asia										
1959-61	134.4	15.9	25.4	21.0	11.1	22.6	143.9	8.0	21.3	72.3
1970	137.7	17.9	25.0	20.4	10.6	24.4	145.4	8.6	22.2	80.6

Table 2.--Consumption per capita per year of foods by subregion, average 1959-61 and projected 1970--Continued

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
----- Kilograms -----										
<u>Far East</u>										
India										
1959-61	25.6	104.6	45.2	21.0	29.2	16.4	45.0	3.6	7.7	48.9
1970	31.8	111.5	43.6	21.2	30.9	20.0	48.7	4.0	7.7	53.5
Other South Asia										
1959-61	53.4	152.3	11.3	9.5	16.0	14.5	64.0	3.6	20.0	42.5
1970	59.6	153.4	10.0	8.9	15.8	16.2	69.0	4.3	18.4	41.9
Japan										
1959-61	37.6	154.3	18.2	76.1	13.6	15.8	108.3	5.0	60.8	19.0
1970	40.0	145.9	11.2	74.5	16.6	20.2	142.1	7.7	77.5	54.5
Other East Asia										
1959-61	7.0	168.9	19.3	95.5	15.8	10.1	116.8	5.1	23.2	8.0
1970	7.6	169.0	22.1	98.0	15.8	11.1	118.1	5.7	24.8	8.9
Communist Asia										
1959-61	28.2	112.0	38.8	76.8	10.1	2.3	42.1	2.8	11.8	1.8
1970	30.2	118.9	42.6	85.2	13.8	2.6	71.5	3.5	19.9	1.9
Oceania										
1959-61	114.4	3.0	7.0	44.6	3.2	53.1	99.8	19.0	132.0	208.2
1970	108.6	2.8	6.6	44.6	3.5	51.2	121.3	19.9	130.1	224.0
<u>World</u>										
1959-61	55.9	72.1	41.4	90.1	13.6	19.2	81.3	8.5	35.6	66.4
1970	55.0	76.3	41.4	89.4	15.3	21.5	94.7	9.3	40.3	67.6

1/ See Appendix for definition of food groups.

rates of increase in per capita income. Per capita consumption of wheat and other starchy crops is expected to drop as protein and fat consumption advances.

About one-fourth of the world's people have diets for which the percentage of high carbohydrate food ranges between 50 and 70 percent of the total calorie value. Per capita calorie, protein, and fat consumption as well as percentage of high carbohydrate foods is shown to change appreciably from the 1959-61 period, reflecting the dynamic economic development in most of these subregions.

Southern Europe, Japan, and USSR are indicated to experience the greatest changes in diet quality by 1970. Japan and Southern Europe have low population growth rates and are projected to have the highest growth rates in per capita income. Consequently, their

projected gains in total calorie consumption, as well as improvement in the quality of the diet, are outstanding. A significant drop is expected in the consumption per capita of most traditional staples, including a drop in rice consumption in Japan--historically significant in rice consumption. As a result, consumption per capita of high quality foods, particularly fruits, vegetables, and animal products, are shown to increase rapidly, resulting in higher per capita intake of protein and fat.

Although the lack of data makes reliable projections for the USSR difficult, analyses of current statistics and announced policies indicate the quality of the diet by 1970 will have advanced only slightly less than indicated for Southern Europe. Despite considerable gain in per capita fat consumption, the USSR is lagging behind the rest of Europe.

About three-fifths of the world's people rely upon high carbohydrate foods for 70 percent or more of their total calorie intake. Subregions with such characteristics account for the greater part of current and future world food problems and no significant advances in the quality of the diet are projected for 1970. Although per capita calorie level is projected to rise--due largely to projected increases in food imports--most of these subregions are experiencing great increases in population, low incomes, and diets below nutrient standards in terms of calories, protein, and fat.

India is typical of the subregions for which a rather constant diet pattern is projected over the 1960 decade. As in 1959-61, the 1970 projections show that some three-fourths of India's diet will still consist of high carbohydrate foods. Failure to achieve planned goals in agricultural production and continued rapid population expansion will result in little change from the current reliance upon the traditional food staples as the major source of food. Increases are projected in per capita consumption of both wheat and rice, while most high quality foods remain relatively constant; milk products is an exception.

Reliable data are scarce for Communist Asia, but this large subregion has a significant impact upon any analysis of the world food situation. Therefore, very rough projections were made for Communist China, which constitutes over 95 percent of the population of the subregion. The substantial changes shown

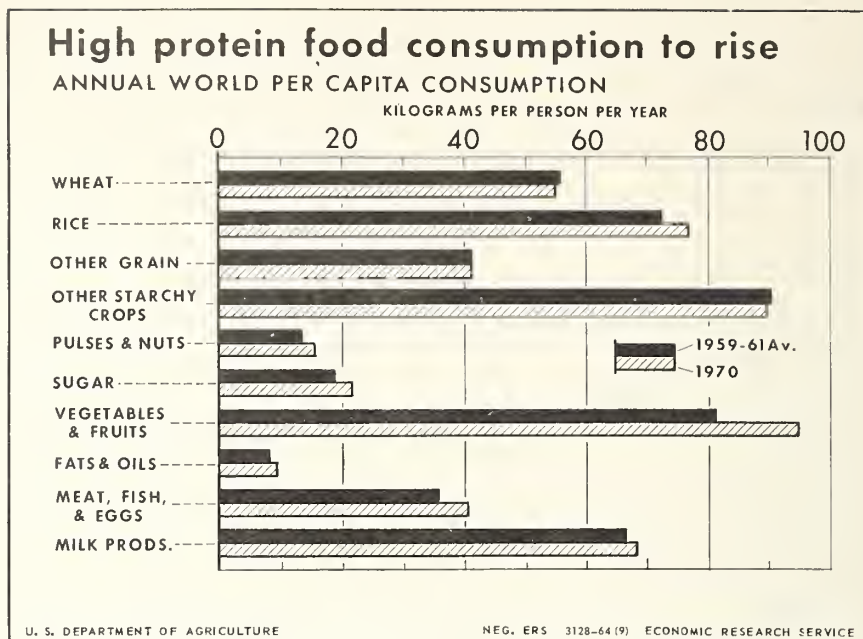


FIGURE 1

for the consumption pattern over the projected period result mostly from the serious conditions believed to exist in Communist China during 1959-61. Because of unusually bad weather and the failure of government policies, consumption of food per capita during 1959-61 was believed to have dropped to a record low of less than 1,800 calories per day, mostly composed of the basic, low quality food staples. However, a review of currently announced policies and actions, which give greater emphasis to food production and trade, and the probable return of more normal weather conditions, leads to the conclusion that Communist China may again reach a daily calorie intake of over 2,000 calories per capita. This is about the level believed to have existed during the 1956-58 period. Although the consumption projections indicate substantial improvement in total consumption and in the quality of the diet, these gains still leave Communist Asia with the poorest diet in the world.

Aggregate Consumption

During the 1960 decade, world demand for food is projected to increase more rapidly than population. Rice will provide the greatest increase in the consumption of high carbohydrate foods, while the demand for wheat will show the least increase. ^{3/}

Vegetables and fruits, meat, fish, and eggs are expected to provide the major increase in the consumption of high quality foods. This significant increase reflects the improvement in the quality of the diet as per capita incomes increase. Even in subregions where per capita income levels are extremely low, slight increases projected in income are expected to result in increased per capita consumption, especially of fruits and vegetables.

Despite a projected decline in per capita consumption of rice in 5 subregions, including Japan, world rice consumption by 1970 is expected to increase 27 percent above 1959-61. India, Communist Asia, and Other East Asia show the largest aggregate gains. Communist Asia alone accounts for over 20 million metric tons of the projected increase; however, this is only about 10 percent above the probable aggregate consumption in 1958.

Demand for fats and oils shows significant gains throughout the world, but the greatest increase is projected for Communist Asia. Moving up from a low-level period, consumption of fats and oils is expected to reach a 1970 level of approximately 3 million metric tons.

The total consumption of milk products, in whole milk equivalent, is projected to increase to a 1970 level of 22 percent over the base period. The greatest gain is shown for the USSR, where per capita consumption in 1970 is projected to increase 45 percent. India, West Asia, and Japan show substantial

increases. Consumption in the United States, Canada, and Northern Europe will not keep pace with population growth although supplies will be plentiful.

Value of Consumption

Upon converting the consumption of food into U.S. dollars by using 1959-61 world prices, the value of world food consumption is projected to increase by \$42.8 billion. This increase is the combined effect of a larger population, increased per capita consumption of most food groups, and a relatively greater consumption of the more expensive foods such as fruits, vegetables, and animal products.

The value of per capita consumption is expected to increase for all subregions of the world. The increase is expected to be greatest for Communist Asia where, however, consumption levels are expected to still be low in 1970 in terms of quantity as well as quality. An increase of more than 20 percent is also projected for Japan, which is followed by Southern Europe and USSR, with increases of 17 and 15 percent, respectively. In these subregions, average national diets are adequate but contain smaller amounts of the expensive foods than the other more developed areas. Incomes per capita are expected to continue to show a substantial rate of increase, with a consequent increase in effective demand, which is reflected in a continued emphasis on the more expensive foods.

At the other extreme are four subregions with increases in the dollar value of per capita consumption projected at less than 1.5 percent. They include Canada, the River Plate, and Oceania, where calories, proteins, and fat per capita are already among the highest in the world. Also included is Other South Asia where the present poor diet is expected to deteriorate in quality, primarily as a result of decreased consumption of animal products.

^{3/} Percentages are in table 5; aggregate quantities are in Appendix tables 36 and 37.

Table 3.--Calorie, protein and fat consumption per capita per day by subregion in ascending order of percentage of calories from high carbohydrate foods, average 1959-61 and projected 1970

Subregion	Calories	Calories from high carbohydrate foods			Protein	Fat
		Proportion	Rank 1959-61	Rank 1970		
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Number</u>	<u>Grams</u>	<u>Grams</u>
United States						
1959-61	3,190	40	1		95.3	146.3
1970	3,180	38		1	95.5	147.8
Canada						
1959-61	3,100	42	2		95.6	140.4
1970	3,070	40		2	95.3	143.0
Oceania						
1959-61	3,260	43	3		101.3	145.7
1970	3,220	40		3	101.6	145.9
Northern Europe						
1959-61	3,060	48	4		88.4	128.7
1970	3,090	44		4	90.4	140.6
River Plate						
1959-61	3,200	56	5		101.0	117.1
1970	3,200	54		5	102.1	120.9
Southern Europe						
1959-61	2,720	60	6		78.5	80.5
1970	2,870	54		6	84.6	97.0
Eastern Europe						
1959-61	3,000	66	7		77.3	88.5
1970	3,030	64		7	77.4	94.6
USSR						
1959-61	3,040	73	14		86.7	66.7
1970	3,170	67		8	89.5	83.3
Brazil						
1959-61	2,710	71	11		65.0	52.1
1970	2,890	69		9	69.5	57.6
Mexico						
1959-61	2,580	70	9		67.8	60.2
1970	2,640	69		10	69.4	61.8
Other South America						
1959-61	2,260	70	10		57.3	50.8
1970	2,410	69		11	62.0	56.8
Japan						
1959-61	2,360	78	17		69.9	31.7
1970	2,600	70		12	79.8	49.7
Central America and Caribbean						
1959-61	2,240	69	8		54.2	52.4
1970	2,260	70		13	55.2	50.7
West Asia						
1959-61	2,350	72	13		69.1	45.5
1970	2,430	71		14	71.6	48.2
Southern Africa						
1959-61	2,670	72	12		83.9	66.5
1970	2,810	72		15	89.7	68.0
North Africa						
1959-61	2,210	73	15		68.0	40.6
1970	2,320	72		16	71.2	45.2
India						
1959-61	2,060	74	16		55.6	30.3
1970	2,220	74		17	59.2	32.7
Other East Asia						
1959-61	2,150	78	18		45.0	35.5
1970	2,270	77		18	47.5	39.6
Other South Asia						
1959-61	2,120	79	19		55.0	28.7
1970	2,230	79		19	59.8	30.8
West Central Africa						
1959-61	2,460	81	20		51.8	45.6
1970	2,530	81		20	54.4	47.3
East Africa						
1959-61	2,390	83	21		65.2	37.4
1970	2,490	82		21	68.7	39.7
Communist Asia						
1959-61	1,790	87	22		47.5	19.7
1970	2,030	83		22	55.5	27.7

Table 4.--Value of food consumption, total and per capita, by subregion, average 1959-61 and projected 1970.

Subregion	Total food consumption <u>1/</u>				Per capita food consumption		
	1959-61	1970	Change		1959-61	1970	Change
	Mil. U.S. dol.	Mil. U.S. dol.	Mil. U.S. dol.	Pct.	U.S. dol.	U.S. dol.	Pct.
<u>Western Hemisphere</u>							
United States.....	19,644	23,412	3,768	19.2	109.2	112.6	3.1
Canada.....	1,862	2,411	549	29.5	104.0	105.2	1.2
Mexico.....	1,527	2,138	611	40.0	43.7	45.1	3.2
Central America and Caribbean....	1,537	2,046	509	33.1	47.5	48.7	2.5
Brazil.....	3,919	5,721	1,802	46.0	55.5	59.8	7.7
River Plate.....	2,211	2,658	447	20.2	97.2	98.3	1.1
Other South America	2,547	3,750	1,203	47.2	49.4	55.3	11.9
<u>Europe</u>							
Northern Europe....	19,683	22,679	2,996	15.2	93.2	100.2	7.5
Southern Europe....	6,507	8,217	1,710	26.3	67.1	78.7	17.3
Eastern Europe....	7,706	8,917	1,211	15.7	66.0	70.0	6.1
USSR.....	13,813	18,178	4,365	31.6	64.5	74.3	15.2
<u>Africa and West Asia</u>							
North Africa.....	3,006	4,065	1,059	35.2	35.4	38.6	9.0
West Central Africa	3,410	4,465	1,055	30.9	31.3	33.2	6.1
East Africa.....	1,985	2,643	658	33.1	40.9	43.3	5.9
Southern Africa....	1,012	1,345	333	32.9	57.4	61.1	6.4
West Asia.....	3,363	4,454	1,091	32.4	42.4	44.1	4.0
<u>Far East</u>							
India.....	12,884	17,200	4,316	33.5	29.8	32.0	7.4
Other South Asia...	4,456	5,821	1,365	30.6	35.3	35.8	1.4
Japan.....	4,768	6,390	1,622	34.0	51.2	62.5	22.1
Other East Asia....	8,805	11,662	2,857	32.4	35.8	37.0	3.4
Communist Asia....	16,765	25,640	8,875	52.9	23.5	30.3	28.9
Oceania.....	1,488	1,846	358	24.1	117.2	118.8	1.4
World.....	142,898	185,658	42,760	29.9	47.4	51.3	8.2

1/ See Appendix for unit value weights.

Table 5.--Percentage change in food consumption, total and per capita, by food group and subregion, average 1959-61 and projected 1970 1/

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
----- <u>Percent</u> -----										
<u>Western Hemisphere</u>										
United States										
Total	7.3	36.2	22.0	15.6	13.9	15.8	14.2	17.1	25.3	7.8
Per capita	-7.2	15.4	5.9	0.0	-1.0	0.2	-1.3	1.4	8.4	-6.7
Canada										
Total	16.4	11.8	10.6	12.9	19.8	26.8	29.6	29.2	34.3	22.1
Per capita	-9.1	-10.7	-14.2	-11.8	-5.9	-0.9	1.3	0.9	5.0	-4.6
Mexico										
Total	40.0	37.2	38.1	38.5	36.7	44.2	42.1	39.6	38.6	44.6
Per capita	3.1	0.0	1.8	.8	0.9	6.5	4.7	2.3	2.2	6.5
Central America and Caribbean										
Total	29.5	22.8	35.7	31.5	34.7	59.0	32.8	22.9	32.6	32.4
Per capita	-0.4	-5.6	4.4	1.2	3.8	22.3	2.2	-4.9	2.0	1.9
Brazil										
Total	43.5	39.9	54.2	38.1	44.6	41.9	51.9	63.2	48.9	40.0
Per capita	5.9	3.1	13.6	1.8	6.7	4.5	11.9	21.4	9.8	3.3
River Plate										
Total	14.8	20.2	14.6	19.0	20.3	17.3	25.9	30.3	21.1	7.6
Per capita	-3.4	1.3	-3.1	0.1	3.1	-1.5	6.0	9.9	2.0	-9.3
Other South America										
Total	34.3	40.4	37.5	39.4	41.9	37.4	44.4	48.1	57.8	43.7
Per capita	2.0	6.8	4.6	6.0	8.5	4.5	9.8	12.7	19.8	9.2
<u>Europe</u>										
Northern Europe										
Total	-8.9	9.5	-19.9	-3.9	6.2	11.9	23.3	15.4	25.0	2.1
Per capita	-15.0	0.0	-25.4	-10.3	0.0	4.4	15.0	7.6	16.7	-4.7
Southern Europe										
Total	-4.5	16.2	-5.4	6.5	6.4	30.8	23.6	28.6	48.8	24.9
Per capita	-11.3	8.9	-12.4	-1.0	-0.7	21.8	14.9	19.4	38.3	16.1
Eastern Europe										
Total	17.7	25.2	-18.2	4.9	29.7	27.9	28.2	19.4	17.0	11.5
Per capita	7.9	15.6	-25.1	3.9	17.9	17.2	17.5	9.4	7.2	2.2
USSR										
Total	12.6	15.9	-0.4	-4.6	14.0	58.5	59.0	49.3	34.3	46.1
Per capita	-1.4	0.0	-12.8	-16.5	0.0	38.9	39.2	30.3	17.6	27.9

Continued-

Table 5.--Percentage change in food consumption, total and per capita, by food group and subregion, average 1959-61 and projected 1970--Continued

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
----- Percent -----										
<u>Africa and West Asia</u>										
North Africa										
Total	34.1	45.9	28.2	21.2	31.6	43.8	34.5	43.8	38.2	31.6
Per capita	7.9	17.6	3.1	-2.3	5.5	16.1	8.2	16.1	11.0	5.9
West Central Africa										
Total	72.4	31.1	28.0	23.0	34.8	83.2	32.5	26.3	39.8	36.6
Per capita	38.1	6.1	3.8	-0.4	9.5	48.7	7.5	2.2	13.7	10.4
East Africa										
Total	90.2	29.8	30.9	15.8	53.8	63.8	31.6	37.3	46.2	11.8
Per capita	51.4	3.2	4.1	-7.9	22.0	30.5	4.5	8.6	16.1	-11.1
Southern Africa										
Total	49.4	35.0	24.9	27.9	43.0	35.2	26.2	31.2	34.1	30.2
Per capita	19.7	8.9	0.1	2.7	13.3	8.3	1.0	4.7	7.5	4.2
West Asia										
Total	30.3	43.4	25.3	23.4	21.2	37.4	28.5	37.3	32.8	41.9
Per capita	2.4	12.6	-1.6	-2.9	-4.5	8.0	1.0	7.5	4.2	11.5
<u>Far East</u>										
India										
Total	54.9	32.4	19.7	25.6	31.8	51.7	34.5	36.8	24.5	36.0
Per capita	24.2	6.6	-3.5	1.0	5.8	22.0	8.2	11.1	0.0	9.4
Other South Asia										
Total	43.5	29.6	14.3	19.9	27.3	44.0	38.8	53.5	18.4	26.9
Per capita	11.6	0.7	-11.5	-6.3	-1.2	11.7	7.8	19.4	-8.0	-1.4
Japan										
Total	16.5	3.7	-32.6	7.3	34.5	40.1	43.9	67.7	39.8	215.2
Per capita	6.4	-5.4	-38.5	-2.1	22.0	27.8	31.2	54.0	27.5	186.8
Other East Asia										
Total	38.6	28.0	46.6	31.3	27.9	40.1	29.4	44.4	36.6	42.6
Per capita	8.6	0.1	14.5	2.6	0.0	9.9	1.1	11.8	6.9	11.2
Communist Asia										
Total	27.1	26.1	30.6	31.8	62.0	32.1	101.8	50.2	99.6	28.5
Per capita	7.1	6.2	9.8	11.0	36.6	13.0	69.8	25.0	68.6	5.6
Oceania										
Total	16.2	15.8	14.6	22.2	34.1	17.9	48.6	27.7	20.6	31.6
Per capita	-5.1	-6.7	-5.7	0.0	9.4	-3.6	21.5	4.7	-1.4	7.6
<u>World</u>										
Total	18.2	27.1	20.1	19.1	34.9	34.6	39.8	31.5	36.0	22.4
Per capita	-1.6	5.8	0.0	-0.8	12.5	12.0	16.5	9.5	13.2	1.8

1/ See Appendix for definition of food groups.

Table 6.--Population of subregions, world share and man-land ratios, midpoint 1959-61, population projected 1970

Subregion	Population <u>1/</u>				Share of world agri-cultural land 1959-61	Man-land ratio <u>2/</u> 1959-61
	1959-61	World share 1959-61	Annual growth rate 1959-61 to 1970	1970		
	<u>1,000</u>	<u>Pct.</u>	<u>Pct.</u>	<u>1,000</u>	<u>Pct.</u>	<u>Number/100 acres</u>
<u>Western Hemisphere</u>						
United States	179,900	6.0	1.5	208,000	11.3	16
Canada	17,900	0.6	2.5	22,914	1.6	12
Mexico	34,934	1.2	3.1	47,406	2.4	15
Central America and Caribbean	32,328	1.1	2.7	42,041	0.6	61
Brazil	70,551	2.3	3.1	95,739	3.2	23
River Plate countries	22,753	0.7	1.7	27,031	4.0	6
Other South America	51,549	1.7	2.8	67,798	2.1	25
<u>Europe</u>						
Northern Europe	211,283	7.0	0.7	226,377	2.5	88
Southern Europe	96,967	3.2	0.7	104,370	1.4	70
Eastern Europe	116,771	3.9	0.9	127,400	2.0	61
USSR	214,217	7.1	1.3	244,600	15.3	15
<u>Africa and West Asia</u>						
North Africa	84,813	2.8	2.2	105,421	4.7	19
West Central Africa .	108,808	3.6	2.1	134,346	6.6	17
East Africa	48,563	1.6	2.3	61,056	5.0	10
Southern Africa	17,619	0.6	2.2	21,997	5.1	4
West Asia	79,391	2.7	2.4	101,012	5.1	16
<u>Far East</u>						
India	431,700	14.3	2.2	536,646	4.4	100
Other South Asia	126,397	4.2	2.5	165,755	1.2	108
Japan	93,200	3.1	0.9	102,216	0.2	527
Other East Asia	246,238	8.2	2.5	315,044	1.6	154
Communist Asia	712,907	23.7	1.7	846,768	7.4	100
Oceania	12,700	0.4	2.0	15,538	12.3	1
World	3,011,489	100.0	1.8	3,616,259	100.0	31

1/ Where available, 1959-61 population figures were taken from USDA food balance sheets and represent the 1959-61 midpoint. Other population figures were taken from official sources. Growth rates reflect current trends. The 1970 population projections were checked against those made by the U.S. Census Bureau, the United Nations and other organizations.

2/ Statistics on total agricultural land are from the FAO, "Production Yearbook, 1962." Man-land ratios are expressed in terms of number of people per 100 acres of total agricultural land (arable land and land under permanent crops plus permanent meadows and pastures).

Nonfood Uses

Food for nonfood uses includes seed, waste, feed, and that part of industrial use not returned for food consumption in a processed form. For most of the food groups, nonfood use rises about in line with increases in production and consumption. (See Appendix tables 36 and 37.)

Feed grains are a notable exception. Significant increases are projected for feed use in the production of meat, eggs, and milk. Japan is an outstanding example. While consumption of wheat and rice for food shows only a modest increase of 16 and 4 percent, respectively, nonfood use of these grains shows an increase of 42 and 24 percent. For other grains, the 1970 nonfood use in Japan is projected to increase 112 percent over the 1959-61 level. These increases largely reflect additional imports of feed grains, mainly corn.

Canada, Mexico, the River Plate countries, and East Africa will utilize more wheat for feed, while Mexico, Northwest Europe, the USSR, North Africa, and Other East Asia are projected to have substantial gains in all categories of grains. Nonfood uses of grain in India and Communist Asia show lower increases than those for grains for food use, reflecting acute pressure of population upon food supplies.

Factors Affecting Demand

Population

Population growth is a major factor affecting the pressure upon food supplies. This growth is determined by the total number of births minus the total number of deaths. Over most of the long scope of history, the number of births in the world has not significantly exceeded the number of deaths in any decade. However, during the last few

decades, man has drastically altered this historical balance and a new equilibrium has not yet developed. (24) 4/

The 1959-61 world population exceeded 3.0 billion people. Increasing at a projected annual compound rate of 1.8 percent, this total would exceed 3.6 billion by 1970.

The size of the world population is less of a food problem than its uneven distribution. Communist Asia alone accounts for nearly one-fourth of the population. This is greater than all Europe (including the USSR) and exceeds the combined population of the Western Hemisphere, Africa, and West Asia. India's population represents approximately 14 percent of the total. On the other hand, Oceania, Canada, Central America and Caribbean, River Plate, and Southern Africa each has less than 1 percent of the world total.

Man-land ratio: Many countries are still largely dependent upon agriculture. For them the relation of the population to agricultural land is one of the crucial elements in their current struggle to feed their people.

Of the world's total land area of 33.3 billion acres, only 9.7 billion acres are considered agricultural land; of this, only 3.5 billion acres are classified as arable land. (7) While the Western Hemisphere accounts for the largest percentage of the total land area, it accounts for only about 25 percent of the total agricultural land and 13 percent of the population. Europe, excluding USSR, has the smallest share of the world land area and the smallest share of the agricultural land, 3.9 percent. The Far East has the greatest food problem, partly because it has over half of the world population, only one-fourth of the agricultural land, and most of the people are dependent upon agriculture for a livelihood.

4/ Underscored numbers in parenthesis refer to References at the end of the report.

The impact of this population-land phenomenon can be seen by a comparison of the population growth rate and man-land ratio to the availability of food. For the entire world, the rate of population growth is just under 2 percent and the man-land ratio (total agricultural land) is slightly over 30 persons per 100 acres. Compared with this world average there is wide variation among the subregions--from a high population growth rate of 3.1 in Brazil and Mexico to a rate of 0.7 percent for both Northern Europe and Southern Europe. The man-land ratio varies from a high of 527 per 100 acres in Japan to a low of 1 per 100 acres in Oceania.

The subregions of the world can be divided into 4 groups, based on the relationship between population density and growth and food supplies. Canada, Oceania, River Plate, South Africa, the United States, and the USSR have some of the lowest man-land ratios and low population growth rates. Canada is an exception, with a growth rate boosted to 2.5 percent as a result of a high level of immigration. These subregions are the big food exporters of the world. Most have been able to combine vast land resources with technical know-how to achieve a level of food production far beyond the needs of their own people. In some of these subregions, major agricultural problems are associated with an excess of production.

Northern Europe, Southern Europe, Eastern Europe, and Japan are the big agricultural importing areas. They are characterized by extremely low population growth rates, high man-land ratios, and also a relatively high level of industrialization. Rapid economic expansion has given to most of these areas the purchasing power to satisfy the increasing demand for better foods. Therefore, their net imports of agricultural commodities, particularly higher quality foods and feed grains for livestock expansion, continue to higher levels.

The subregions with relatively low man-land ratios but high population growth rates have been able to show some improvement in the level and quality of their diet. These include Mexico, Central America and Caribbean, Brazil, Other South America, North Africa, West Central Africa, East Africa, and West Asia. Some countries in these areas have recently achieved a national average diet which equals the minimum standard; others will approach the level by 1970. Their imports and exports of food are about in balance. Land is available for development but, with the exception of Mexico, all these subregions have had difficulty achieving a satisfactory rate of economic growth.

In the final group are the subregions with chronic food deficits. These include Communist Asia, India, Other East Asia, and Other South Asia. These subregions have some of the highest man-land ratios combined with relatively high population growth rates and small industrial sectors. These are often accompanied by low crop yields because of inadequate fertilizer inputs, technological backwardness, and lack of economic incentives. Half of the world's people live in these subregions and they have been unable to grow enough to feed themselves or obtain the purchasing power to buy what they need.

India has a population growth rate of well over 2 percent per year, a man-land ratio of 1 per acre, and low crop yields. India's population by 1970 is projected to increase by over 104 million over the base period. The gravity of this population growth rate and man-land ratio pattern is pointed up by the failure of agricultural production per capita to maintain previously achieved rates of improvement and the inability of industry to absorb more than a small part of the increasing labor force.

The man-land ratio for Communist Asia is also 1 person per acre of agricultural land. (On an arable basis, however, Communist Asia

has only about 0.4 acre per capita.) Estimates of population growth rates vary from about 1.5 percent to over 2.0 percent. At a growth rate of 1.7 percent, Communist Asia's projected population will increase to over 846 million by 1970. With agricultural production showing considerable recovery from the extreme low of 1959-61, consumption is expected to increase somewhat. However, a sizable calorie deficit is still predicted for 1970.

Urbanization: The impact of population upon food supplies in developing countries can also be observed in terms of the population concentration in cities and industrial areas. The extremely rapid growth of urban populations necessitates, in addition to an increase in food production, the sometimes more difficult task of improving the efficiency of the distribution system so food can be moved from producing areas to the urban areas. Incentives must be used to bring farmers into the money or commercial economy. Marketing facilities have to be built to handle the transport, storage, processing, and distribution of farm products. If this is not accomplished, the urban centers have to rely on imports for much of their food supplies.

A few examples of the rapid polarization of the population in urban areas can be cited. In Egypt from 1937 to 1957, the total population increased by 45 percent, but the population in cities of over 100,000 increased by 152 percent. In the same period, the total Philippine population rose by 55 percent while that of the large cities increased by 155 percent. Between 1941 and 1961, the total population of the area which is now Pakistan grew by nearly 30 percent while the population of the cities increased by some 250 percent. From 1949 to 1959, the total population in the Congo (Leopoldville) increased by 26 percent while the population of large cities increased by 420 percent. (19)

Efforts to control population: Despite the persistent pressure of the rapidly growing population upon the world food supply,

few countries have limited the growth of population. While mortality rates have been reduced greatly, little has been done to encourage a reduction in birth rates, which have remained relatively constant.

Of the countries faced with a crucial population problem, Japan has reacted most effectively. During the immediate postwar years, when Japan faced the necessity of rebuilding its economy on a reduced land base but with a large prospective increase in population, the government decided that economic growth would be facilitated by a reduction in the birth rate. A program of education and assistance in family planning was initiated, with both government and private groups cooperating. By the late 1950's, the population increase had dropped below 1 percent per year.

There are indications that other countries are acting to reduce rapid increases in population. For example, the government of India has launched an ambitious program of popularizing family planning and birth control. (4) However, few people believe that family planning in India will reduce the population growth rate during the 1960 decade. A large family means economic security for the parents in old age. Without substantial changes in this social-economic attitude, progress will be slow. In fact, the efforts of family planning clinics may, in the first stages, result in a decrease in child mortality and contribute to a further rise in population growth.

Income

Income levels, combined with income growth rates, rank second only to population among the factors influencing the demand for food. With rising incomes, people consume more food and particularly higher quality and more expensive foods, which require greater agricultural resources for their production.

Table 7.--Per capita national income by subregion, average 1960-62 and projected 1970.

Subregion	Per capita income		
	1960-62 <u>1/</u>	Annual growth rate 1960-62 to 1970	1970
	<u>Dollars</u>	<u>Percent</u>	<u>Dollars 2/</u>
United States	2,342	1.3	2,630
Canada	1,482	2.5	1,851
Oceania	1,256	1.2	1,395
Northern Europe	1,093	3.2	1,446
Southern Europe	445	4.3	648
Japan	395	6.4	690
River Plate	365	1.0	400
Southern Africa	360	3.0	470
Mexico	281	1.0	307
Other South America	263	2.1	316
Central America and Caribbean	227	1.3	256
Brazil	211	1.0	231
West Asia	193	3.1	253
North Africa	112	1.6	129
East Africa	86	2.6	108
Other East Asia	82	1.6	95
West Central Africa	81	2.6	102
Other South Asia	69	1.8	81
India	69	1.0	75

1/ Per capita incomes for 1960-62 were calculated from data obtained from the Statistics and Reports Division, Agency for International Development, and current issues of the International Financial Statistics. Per capita income figures were obtained by converting per capita gross national product to per capita income by means of an average NI/GNP ratio for select years calculated from current issues of IFS. Growth rates reflect current trends. Data for USSR, Eastern Europe, and Communist Asia were either unavailable or unreliable.

2/ Constant U.S. dollars, 1960-62.

World average per capita income is projected to gain significantly during the 1960's. However, it is estimated that approximately 50 percent of the world's population by 1970 will still have annual incomes of less than \$100 per person. Per capita incomes in the Communist subregions will probably show some improvement during the 1960's, although data for making comparable estimates are not available.

The highest per capita incomes of the world are in Canada, Oceania, and the United States. These subregions are heavy consumers of high quality foods such as meats, dairy products, fruits, and vegetables. They also constitute the world's largest sources of food exports.

The River Plate and Southern Africa have per capita national incomes considerably less than the other net agricultural exporting subregions, but higher than that received by about 70 percent of the world's population. Economic growth in the River Plate countries has been hampered by both political and economic factors, including inflation and inadequate capital for investment. These have resulted in a per capita national income growth rate estimated to be only 1.0 percent. Southern Africa, having recently advanced technologically in both industrial and agricultural production, is expected to raise its per capita national income at a continued growth rate of 3.0 percent.

The net agricultural importing subregions show the most dynamic economic growth. Estimated growth rates of per capita national income range from 3.2 percent for Northern Europe to 6.4 percent for Japan. Japan, whose estimated income for 1970 is \$690, has achieved a standard of living unprecedented in the Far East. Southern Europe has recently made considerable economic progress, resulting in a national per capita income growth rate of 4.3 percent, and is expected to continue its rapid development. In this grouping of subregions, especially

for Japan and Southern Europe, the significant increase in per capita income will be reflected substantially in the changes in the demand for food, particularly in the composition of the diet.

The developing subregions of the world have per capita national incomes ranging from a high of \$281 for Mexico to a low of \$81 for West Central Africa.

Brazil, with a very high population growth rate, has a very low rate of income growth per capita. These factors, in addition to runaway inflation, have engendered a lack of confidence in the country's ability to advance economically. A slump has occurred in Brazil's previously expanding economy. Progress toward a more stable government may reverse this situation.

The chronic food-deficit subregions of the world are also the heavily populated subregions with predominately agricultural economies. They are generally developing at a rather low rate due in considerable part to high population growth rates, high population densities, and shortages of the necessary developmental resources and technology found in relative abundance in the more advanced countries. In these subregions, per capita national incomes are at a low level, and increasing at a low rate. As a consequence, these countries are forced to rely upon inexpensive high carbohydrate foods for a large percentage of their total calorie intake. They require substantial imports of food grains to supplement domestic production.

India has a very low level of per capita income--increasing at an annual rate of about 1 percent. It is not expected to move from this position during the decade of the 1960's. As India enters the fourth year of its Third Five-Year Plan, it will not likely attain many of the major industrial and agricultural goals set for 1965/66. This low growth rate in per capita income stems largely from failure to

make substantial gains in agriculture. Agricultural production per capita declined 1 percent and food production per capita was down 2 percent in 1963 from the previous year. (33)

Communist Asia is believed to have a per capita income of only \$50 to \$60. There appears little prospect of substantial improvement during the 1960's. Although this low income is due partly to rapidly growing population, the present depressed economic situation is intricately tied to agriculture, which has experienced sharp reverses. Optimistic projections of agricultural recovery would still leave food production per capita below the 1956-58 level.

The subregion of Other South Asia had a per capita income of only \$69 in 1960-62. Ceylon has a much higher per capita income, projected to reach \$136 in 1970, due to export cash crops such as tea and rubber. Pakistan's rapidly growing population is expected to severely limit gains in per capita income. Other East Asia has a population growth rate of about 2.5 percent, which aggravates the low rate of economic growth. Although Malaya, Taiwan, and Thailand are expected to have continued favorable economic development, a lack of adequate food supplies will prevail over much of the subregion.

Income levels and diet quality: The correlation between income levels and the percentage of total calories from high carbohydrate foods appears to be quite high. Figure 2 shows that as per capita national income increases the percentage of calories

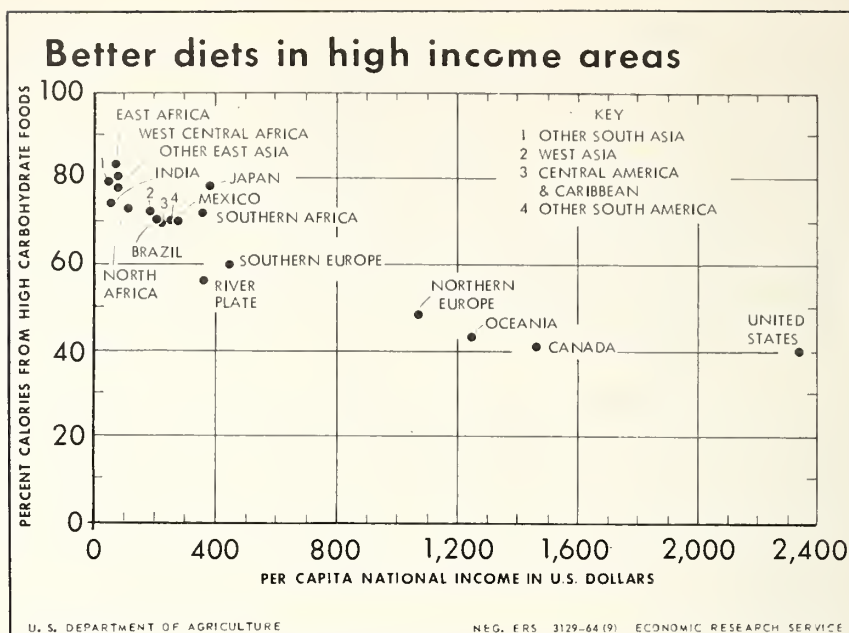


FIGURE 2

represented by high carbohydrate foods decreases. At the extremes, East Africa and West Central Africa, where per capita incomes are less than \$100, show 80 percent of all calories derived from high carbohydrate foods compared to 40 percent for the United States, which has a per capita income of over \$2,300.

The majority of the subregions of the world have national incomes per capita below \$400 and diets in which high carbohydrate foods account for more than two-thirds of the calories. At the other extreme are the 4 subregions of Northern Europe, Oceania, Canada, and United States. They have diets which contain less than 50 percent of calories from high carbohydrate foods. These are also the only subregions having incomes of \$1,000 and over.

Any effort to improve the level of consumption in those countries which have an inadequate diet has to be accompanied by an effort to increase the purchasing power of the people so that they can afford to buy

additional and higher quality food. FAO has estimated that to achieve any substantial improvement in the level of nutrition by 1970, the deficit regions and countries will need to increase their real national income by nearly 5 percent per year. (13)

Income elasticities: Income elasticity measures the percentage increase in food expenditure resulting from a 1 percent rise in per capita income. With rising incomes, people not only tend to consume more food but also shift to more expensive and better quality food. A progressive increase in income per person generally results in increased consumption of such foods as meats, dairy products, fruits, vegetables, and sugar. For nearly all of these products, the income elasticity of demand is higher than unity in the developing countries but diminishes in the developed countries with higher incomes. Since most of these foods are nutritionally desirable, an improved diet is to a considerable extent selected spontaneously by consumers as income rises.

Although it is generally agreed that the income elasticity of demand for all foods declines as the level of income increases, there is considerable uncertainty as to the magnitude of income elasticities for food in specific low income countries and as to how rapidly the elasticities decline. Part of the uncertainty is due to varying definitions of food in different studies and part is due to the fact that two methods are employed in obtaining elasticity estimates. These two methods, time series and cross-sectional budget study analyses, give somewhat different answers.

In an attempt to increase the precision in the projection of consumption levels shown in the World Food Budget, income elasticities were utilized where they were available and appeared to have a reasonable level of reliability. The major sources of elasticity coefficients included various FAO estimates (14) and research sponsored by the U.S. Department of Agriculture, particularly those country studies involving long-term projections of import requirements of selected agricultural products. (37)

Table 8.--Income elasticities for specified food groups by selected subregions ranked in declining order of per capita income, 1960-62.

Subregion	Per capita income	Income elasticities 1/					
		Cereal	Vegetables	Milk	Meat	Eggs	Fish
	U.S. dol.						
United States	2,342	- 0.5	0.25	0.05	0.35	0.0	0.3
Canada	1,482	- 0.5	0.35	0.10	0.40	0.15	0.3
Japan	395	- 0.17	0.5	2.0	1.7	1.0	0.5
River Plate	365	- 0.3	0.6	0.4	0.15	0.1	0.4
Brazil	211	0.15	0.5	0.9	0.7	1.0	0.6
Southern Africa	360	0.1	0.5	0.6	0.5	0.5	0.6
North Africa	112	0.20	0.6	1.0	1.2	1.2	1.0
India	69	0.5	1.0	1.7	1.4	2.2	1.5
Other South Asia 2/ .	69	0.5	0.9	1.7	1.6	2.2	1.5
Other East Asia 3/ .	82	0.5	0.9	3.0	1.6	2.0	1.0

1/ Compiled from data from FAO, "Agricultural Commodities - Projections for 1970", and long-term projection studies of USDA.

2/ Pakistan only.

3/ Indonesia only.

Elasticities vary between different food groups and between the subregions with different income levels. Income elasticities of the high carbohydrate foods, such as cereals, range from a very low level (-0.5) for the high income subregions of the United States and Canada to a higher level (0.5) in the low income subregions. For high protein foods such as meats, although beginning at a much higher level, the income elasticities range from a low of 0.35 in the United States to a high of 1.6 in the low income countries. Likewise, income elasticities for fish range from a low of 0.3 in the United States and Canada to a high of 1.5 in Pakistan and Indonesia. Milk shows the greatest variation, a low of 0.05 in the United States to 3.0 in Indonesia.

Although elasticities vary substantially from high income subregions to the low income subregions, they vary only slightly within the low and high income groups of subregions. In the United States and Canada, elasticities for cereals remain constant, while those for milk and milk products, meat, and fish vary only slightly. The same is true for the low income subregions in which the food group of cereals remains constant while the high protein food groups of meat, eggs, and fish vary only slightly.

For the middle income subregions, however, where economic development has resulted in substantial increases in per capita income as well as significant changes in consumer habits, the elasticities within the various food groups vary substantially and in both directions. For the cereals, income elasticity varies from a -0.17 for Japan to a 0.1 for Southern Africa, with only a \$35 variation in the level of per capita income. However, Southern Africa has a wide variance in income levels within the subregion.

Price

The price elasticity of demand (the effect of price on the demand for food) measures the percentage change in the quantity of a food demanded as the result of a change of 1 percent in the price of the food.

For most subregions, research needed to obtain reliable price elasticities has not been performed. Therefore, for most subregions, the price effect upon the consumption of food was considered to be constant over the projected period. However, the price effect was utilized in balancing supply and demand in the country food balances. Where significant imbalances occurred which could not be resolved within the framework of constant prices, the feasibility of price adjustments was researched. This procedure was also used to some extent in balancing world food imports and exports.

For the Common Market countries, however, price elasticities of demand and supply were considered for projecting 1970 consumption and production. Major assumptions for handling price elasticities for these countries included: (1) Prices gradually converging by 1970 but not reaching a common price due to announced common agricultural policies; (2) a relative rise in the price of pork due to the general rise in grain prices; and (3) a relative fall in prices of poultry meat due to advanced production and processing technology. Most other prices for the area were assumed constant.

The major effect of the consideration of price elasticities upon consumption in the ECC countries resulted in the projection of increased consumption of meats, particularly poultry. The consumption of pork is likely to experience a less rapid gain, due to the rise in pork prices as a result of a rise in the price of feed grains.

Adequacy of Diets

Nutritional Reference Standards

In this study, the estimated national average diets are compared with nutritional reference standards to evaluate the adequacy of the current and projected diets. Adequacy is usually measured against both quantity and quality standards. Such standards can be regarded at best as only rough guides. The quantity standard (calories) is more firmly established than the quality standards (total protein, animal protein, pulse protein, fat, and proportion of diet from high carbohydrate foods).

Calories: Reference standards used in this study for calories are generally in line with those developed by the Food and Agriculture Organization of the United Nations for short-term targets in the Third World Food Survey. (13) These represent physiological requirements for normal activity and health, taking account of environmental temperature, body weights, and distribution by age and sex of the national populations.

Each of the calorie level standards includes a 10-12 percent allowance above physiological requirements as a rough estimate of the loss between the retail level and consumption in the home, including factors such as spoilage and plate waste. In preparing the food balances, account already had been taken of loss from the production to the retail stage.

Protein: There is no simple unit for measuring the nutritional quality of the diet. However, protein content, particularly the animal protein content, is a widely accepted indicator of nutritional quality. Most foods rich in protein are also comparatively good sources of many of the other essential elements. However, the source as well as the total amount of protein is important. If animal foods supply part of the total, the protein quality of the diet is enhanced. Protein from pulses

or legumes is also effective in supplementing protein in grains and is especially important where animal protein is low. Recent investigations show that legume-type foods in combination with certain other vegetative foods can provide the essential protein elements in the proper amounts to fulfill adequately the requirements for growth, normal activity, and good health and can thus reduce the need for animal protein.

Reference standards have been established for total protein, combined animal and pulse protein, and animal protein. The same standards are used for all countries and provide for a minimum allowance of 60 grams of total protein per capita per day, and 20 grams of combined animal and pulse protein, of which 10 grams should be animal protein. The standard for total protein is probably more firmly established than the standards for animal and pulse protein. These reference standards serve to indicate areas where total protein availability is low and where, because of the low availability of animal protein, the quality of protein is probably inadequate. Where the protein level, especially animal protein, is low the diet is probably also deficient in essential amino acids, minerals, and vitamins.

These reference standards for protein are somewhat lower than the short-term targets proposed by FAO in the Third World Food Survey. These targets were 69 grams of total protein and 15 grams of animal protein for the low calorie countries and 75 grams of total protein and 23 grams of animal protein as an average for the world.

The question might be raised as to whether a single standard for protein should be used for all countries although suggested calorie standards are somewhat different. Separate standards for protein could be developed for different countries if reliable estimates of average body weights were available. Or, estimates could be derived using a fixed

percentage of calories to come from protein as a basis, as appears to have been done by FAO in the short-term targets. However, the USDA Nutritional Committee decided to use a single protein standard for all countries.

Fat: Reference standards for fat are expressed in terms of the amount that would provide 15 percent of the reference standard for calories. Nutritionists have not yet determined a minimum requirement for fat, per se. However, in low calorie countries the inclusion of reasonable quantities of fat in a diet which would otherwise rely on starches as the main source of energy would increase the calorie value of the diet while reducing its overall

bulk. This is an important factor in programs geared to improving children's diets in the low calorie countries.

Undernutrition

Undernutrition means inadequacy in the quantity of the diet, that is, in calorie availability. If undernutrition persists, adults will either lose body weight or reduce physical activity, or both. In children, the consequences of low calorie intake are unsatisfactory growth and physical development and a reduction of the high degree of activity characteristic of healthy children. (13)

Table 9.--Nutritional reference standards for calories and fat, per capita per day, by subregion

Subregion	Calories	Fat
	<u>Number</u>	<u>Grams</u>
<u>Western Hemisphere</u>		
United States.....	2,650	45
Canada.....	2,700	46
Mexico.....	2,450	42
Central America and Caribbean.....	2,450	42
Brazil.....	2,650	45
River Plate.....	2,700	46
Other South America.....	2,500	42
<u>Europe</u>		
Northern Europe.....	2,650	45
Southern Europe.....	2,500	42
Eastern Europe.....	2,650	45
USSR.....	2,700	46
<u>Africa and West Asia</u>		
North Africa.....	2,350	40
West Central Africa.....	2,400	41
East Africa.....	2,450	42
Southern Africa.....	2,450	42
West Asia.....	2,450	42
<u>Far East</u>		
India.....	2,300	39
Other South Asia.....	2,300	39
Japan.....	2,350	40
Other East Asia.....	2,350	40
Communist Asia.....	2,350	40
Oceania.....	2,650	45

All subregions, except Oceania, United States, River Plate, and Canada, will show an increase in calorie levels over the decade of the 1960's. All of the subregions that had inadequate calorie intake in 1959-61 are expected to show substantial improvements by 1970. One subregion, East Africa, had inadequate calories in the base period. But it is expected to have adequate supplies by 1970. However, the proportion of the world's people living in subregions with average diets below the calorie reference standard is projected as virtually unchanged, at 60 percent, from 1959-61 to 1970.

Within the subregions with adequate calorie levels, a few countries are inadequate. For example, the food balance for Angola shows a calorie level below the standard;

Southwest Africa and Bechuanaland in Southern Africa also probably have inadequate calorie levels. Brazil has an adequate national average diet, but the northeast part of the country is probably much below the average.

On the other hand, some countries in the diet-deficit subregions have adequate calorie supplies. In 1959-61, these countries included; Costa Rica, Cuba, Trinidad and Tobago, Chile, Algeria, Cyprus, Israel, Lebanon, Turkey, Malagasy Republic, Malaya, and Taiwan. Additional countries in diet-deficit subregions, which are expected to have adequate calorie supplies by 1970, include: Jamaica, Honduras, Panama, Venezuela, Libya, Morocco, Kenya, Tanganyika, and Thailand. Cuba had adequate calorie supplies in 1959-61, but is projected to have a calorie deficiency by 1970.

Table 10.--Calorie level, by subregion in descending order of adequacy, average 1959-61 and projected 1970

Subregion	Calorie level		Calorie standard	Level as percentage of standard	
	1959-61	1970		1959-61	1970
	Number	Number	Number	Percent	Percent
Oceania.....	3,260	3,220	2,650	123	122
United States.....	3,190	3,180	2,650	120	120
River Plate.....	3,200	3,200	2,700	119	119
Northern Europe.....	3,060	3,090	2,650	115	117
Canada.....	3,100	3,070	2,700	115	114
Eastern Europe.....	3,000	3,030	2,650	113	114
USSR.....	3,040	3,170	2,700	112	117
Southern Africa.....	2,670	2,810	2,450	109	115
Southern Europe.....	2,720	2,870	2,500	109	115
Mexico.....	2,580	2,650	2,450	105	108
West Central Africa...	2,460	2,530	2,400	102	106
Brazil.....	2,710	2,840	2,650	102	109
Japan.....	2,360	2,600	2,350	100	111
East Africa.....	2,390	2,490	2,450	97	102
West Asia.....	2,350	2,430	2,450	96	99
North Africa.....	2,210	2,320	2,350	95	99
Other South Asia.....	2,120	2,230	2,300	92	97
Other East Asia.....	2,150	2,270	2,350	92	97
Central America and Caribbean.....	2,240	2,260	2,450	91	92
Other South America...	2,260	2,410	2,500	90	96
India.....	2,060	2,220	2,300	90	97
Communist Asia.....	1,790	2,030	2,350	76	86
World.....	2,360	2,480	2,440	97	102

Table 11.--Protein consumption per capita per day, by subregion in descending order of adequacy of total protein, average 1959-61 and projected 1970

Subregion	Protein consumption						Protein consumption as percentage of standard					
	Total		Animal and pulse		Animal		Total		Animal and pulse		Animal	
	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970
	Grams	Grams	Grams	Grams	Grams	Grams	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Oceania.....	101	102	70	72	68.6	70.4	169	169	350	359	686	704
River Plate.....	101	102	56	58	54.3	56.5	168	170	281	292	543	565
Canada.....	96	95	67	69	64.3	66.4	159	159	334	343	643	664
United States.....	95	96	69	70	63.8	64.9	159	159	343	348	638	649
Northern Europe.....	88	90	54	60	52.0	57.7	147	151	271	300	520	577
USSR.....	87	90	32	39	29.5	36.2	145	149	161	195	295	362
Southern Africa.....	84	90	38	42	35.3	38.4	140	150	191	208	353	384
Southern Europe.....	79	85	32	41	26.5	35.4	131	141	160	204	265	354
Eastern Europe.....	77	77	30	32	28.0	29.4	129	129	152	161	280	294
Japan.....	70	80	30	40	18.0	26.3	117	133	151	198	180	263
West Asia.....	69	72	18	20	13.1	14.9	115	119	94	101	131	149
North Africa.....	68	71	24	26	17.0	18.2	113	119	122	130	170	182
Mexico.....	68	69	30	32	17.2	18.1	113	116	149	158	172	181
East Africa.....	65	69	20	23	11.5	12.9	109	115	102	116	115	129
Brazil.....	65	67	34	38	20.4	21.5	108	116	172	191	204	236
Other South America.....	57	62	26	30	20.6	23.7	96	103	133	150	206	237
India.....	56	59	22	23	7.2	7.8	93	99	108	115	72	78
Other South Asia.....	55	60	17	17	11.0	10.4	92	100	86	82	110	104
Central America and Caribbean.....	54	55	24	25	17.0	17.4	90	92	122	124	170	174
West Central Africa.....	52	54	14	16	5.7	6.4	86	91	73	79	57	64
Communist Asia.....	48	56	10	16	3.2	5.4	79	93	53	78	32	54
Other East Asia.....	45	48	14	15	7.3	8.0	75	79	69	73	73	80
World.....	64	67	26	29	18.6	20.5	107	112	130	145	186	205

In the developed countries, and in particular the United States, no shortage of calories on the average exists, even among the poorest classes. A nationwide U.S. survey indicates that the calorie supply is not greatly influenced by the level of family income, and the calorie supply even for the lowest income groups exceeds the average requirement. But in the less developed countries, the calorie level is greatly influenced by income, and within-country variation in diets between different socio-economic classes of the population may be as large or larger than variations between subregions. For example, a study conducted in the state of Maharashtra in India showed that with a yearly per person expenditure of less than \$33, food consumption in terms of calories per person was 1,500; with expenditures between \$33-\$59, consumption rose to 2,300 calories; and for expenditures over \$60, consumption rose to 2,900 calories. (13)

No reliable or comprehensive data are available from which to estimate the proportion of people who are undernourished. However, some studies on this subject have been conducted in India (1935-48) and Burma (1939-41). According to these studies, nearly 25 percent of the people in India and Burma consume less than the minimum standard of 2,300 calories (27) Similar conditions also exist in other less developed countries and subregions.

Malnutrition

Malnutrition means inadequacy of the nutritional quality of diet. More precisely, it denotes inadequacy of a particular or several essential nutrients, which affect the ability of the individual to lead a healthy active life. (13) If the inadequacies are substantial and prolonged, the individual's resistance to disease will be lowered.

Undernutrition and malnutrition are not mutually exclusive; undernourished people are likely to be malnourished. Diets of poor nutritional quality, especially when accompanied by insufficient quantity, contribute to listlessness, general impairment of health,

poor physical development, and low resistance to infections and diseases. They contribute to high mortality among infants and young children and the short life expectancy in the less developed regions and countries. Diets low in calories have an adverse effect on the efficiency with which the body uses proteins. Therefore, to be nutritionally adequate, diets must have sufficient calories as well as adequate protein.

Diets of poor nutritional quality are common in most of the less developed countries. A nutritionally deficient diet is likely when an excessively high percentage of calories is derived from carbohydrate food (cereals, roots, and other starchy foods) with a very low consumption of animal protein. In the less developed countries, consumption of other protective foods such as fresh vegetables and fruits is often inadequate. Limited supplies, together with improper food preparation, dietary habits, religious restrictions, and traditional prejudices are often responsible for the deficiency of good quality protein and essential minerals and vitamins in the diet.

Protein: Seven subregions were deficient in total protein during 1959-61, 5 subregions were deficient in combined animal and pulse protein, and 4 in animal protein. The serious deficiencies are in West Central Africa, Other South Asia, Other East Asia, and Communist Asia. West Central Africa and Communist Asia are especially low in animal protein. The projections for 1970 indicate substantial improvement in per capita availability of total protein and animal and pulse protein. Within the subregions expected to be deficient in total protein, Costa Rica, Honduras, Jamaica, Nicaragua, Panama, Trinidad and Tobago, Bolivia, Chile, Paraguay, Venezuela, Angola, Togo, Pakistan, and Taiwan are expected to have sufficient supplies of total protein. Many other countries will have supplies only slightly below the standard. Within the subregions projected to have adequate protein supplies, only the Malagasy Republic and Tunisia are expected to be deficient.

Fat: Except for Japan, all the subregions in 1959-61 with adequate supplies of calories and protein also had supplies of fat which met the reference standard. East Africa still will have a small deficit of fat in 1970, although adequate in other categories. By 1970, the only subregions which will clearly have inadequate fat supplies are India, Other South Asia, and Communist Asia.

Within the subregions generally considered adequate in supplies of fat in 1959-61, Guatemala, Haiti, Bolivia, Ecuador, Peru, Ethiopia, United Arab Republic, Ivory Coast, and Iran had inadequate supplies. By 1970, with the exception of Bolivia, Ecuador, and Peru, these countries are still expected to have inadequate supplies of fat.

High carbohydrate foods: The proportion of calories derived from high carbohydrate foods is often used to indicate nutritional adequacy of the diet. The FAO in the Second World Food Survey decided that a ratio exceeding two-thirds of calories in high carbohydrate foods meant the probable existence of considerable malnutrition. (9) Although useful, this indicator lacks precision in measuring the nutritional quality of the diet. For example, it may understate malnutrition where starchy roots are the major source of calories and overstate it where cereals are the major source. Also, it tends to understate the contribution of such foods as milk, fish, fresh fruits, and vegetables, which supply relatively small amounts of calories per unit of volume.

Table 12.--Fat consumption, per capita per day, by subregion in descending order of adequacy, average 1959-61 and projected 1970

Subregion	Fat consumption		Fat standard	Fat consumption as percentage of standard	
	1959-61	1970		1959-61	1970
	Grams	Grams	Grams	Percent	Percent
United States.....	146	148	45	325	328
Oceania.....	146	146	45	324	326
Canada.....	140	143	46	305	311
Northern Europe.....	129	141	45	286	312
River Plate.....	117	121	46	255	263
Eastern Europe.....	89	95	45	197	210
Southern Europe.....	81	97	42	192	231
Southern Africa.....	67	68	42	158	162
USSR.....	67	83	46	145	182
Mexico.....	60	62	42	143	147
Central America and Caribbean.....	52	51	42	125	121
Other South America.....	51	57	42	121	135
Brazil.....	52	57	45	116	128
West Central Africa.....	46	47	41	111	111
West Asia.....	46	48	42	108	115
North Africa.....	41	45	40	102	113
East Africa.....	37	40	42	89	95
Other East Asia.....	36	40	42	89	99
Japan.....	32	50	40	79	124
India.....	30	33	39	78	84
Other South Asia.....	29	31	39	74	79
Communist Asia.....	20	28	39	51	71
World.....	53	59	41	129	144

In 1959-61, 15 subregions had a ratio of calories derived from the high carbohydrate foods greater than two-thirds. No change in this number is expected by 1970. However, this ratio is expected to decline in nearly all countries, especially in Japan and Communist Asia. (See table 3.)

Improvement in Diets

Proportion of world with inadequate diets:

Little change was projected in the proportion of the world with national average diets below the standards discussed above (total protein, animal and pulse protein, animal protein, fat, and the percentage of calories furnished by high carbohydrate foods). This, however, does not mean that no progress will be made in the improvement of diets in this decade. Substantial improvements will occur, both qualitatively and quantitatively, in most subregions and countries.

The proportions of the world population with national average diets which were below the reference standard in 1959-61 and which are likely to be below in 1970 are as follows:

	<u>1959-61</u>	<u>1970</u>
	Percent	Percent
Calories	60.2	60.2
Protein:		
Total	56.8	56.3
Animal and pulse	42.3	40.3
Animal	49.8	50.7
Fat	55.1	53.2
Two-thirds or more		
of calories from		
high carbohydrate foods	78.1	80.0

National average diets do not clearly indicate the proportion of people in the various subregions who may be undernourished or malnourished. Such estimates would require information about variation in requirements and consumption within the populations. Such information is very limited, ^{5/}

A great deal of malnourishment and undernourishment exists not only in the less developed areas but also in some of the more developed areas. Programs to combat the problem can hardly be accomplished without a reasonably accurate evaluation of the extent of the problem, so it is important that much further work be done. Improvement in the national production and utilization estimates, used to determine food availabilities, would permit the preparation of more reliable food balances for estimating the food needs of deficit areas. Also needed are refinements of the nutritional standards and determinations of actual consumption patterns by field surveys in the less developed countries.

Progress in improving diets: Supplies of calories, total protein, and fat will improve in all of the diet-deficient subregions by 1970, with many approaching or exceeding the established reference standards. Except Other South Asia, every subregion deficient in combined animal and pulse protein and animal protein in 1959-61 will have increased supplies by 1970. However, this subregion had adequate supplies of animal protein and is projected to have adequate supplies in 1970.

The above analysis, however, provides little indication of either requirements or availabilities of other essentials in the diet, particularly vitamins and minerals.

Other ways in which diets could be improved would not be shown in national food balance data. For example, improvements in food storage and preparation, and the use of additives--such as synthetic vitamins and amino acids--would not be reflected. Also, changes in the combination of foods consumed because of better food distribution would do much to improve diets.

^{5/} The FAO "Third World Food Survey" concludes that some 60 percent of the people in the underdeveloped areas and up to one-half of the people in the world suffer from undernutrition, malnutrition, or both, (13)

Some of these developments will be fostered by better education, higher incomes, and more rapid economic development as well as by national and international programs for improving diets. In some cases, such developments probably will bring about important improvements in the diet by 1970 which will be in addition to those projected by this study.

Classification of the Subregions

Twelve subregions are projected to have average diets above the minimum reference standards by 1970. Ten subregions will have diets nutritionally deficient. Two of these will meet the energy (calorie) level but not the other requirements. The other eight will have diets inadequate in quantity and quality.

<u>Diet-adequate</u>	<u>Diet-deficit</u>
United States	Central America and
Canada	Caribbean
Mexico	Other South America
Brazil <u>1/</u>	North Africa
River Plate	West Central
Northern Europe	Africa <u>2/</u>
Southern Europe	East Africa <u>2/</u>
Eastern Europe	West Asia
USSR	India
Southern Africa	Other South Asia
Japan	Other East Asia
Oceania	Communist Asia

1/ Brazil has an adequate national average diet, but has many characteristics of diet-deficit subregions. The southern part of the country is much like the River Plate countries; the northeast area probably has an inadequate diet.

2/ Quality deficiency only.

Countries in the diet-deficit subregions which show neither quantitative or qualitative deficiencies in 1959-61 or 1970 include Costa Rica, Trinidad and Tobago, Chile, Cyprus, and Israel. 6/

Disparities in per capita food supplies between the adequate and deficit subregions

are largely associated with differences in per capita food production. Different levels of food production are in turn associated with the disparities in agricultural productivity, investments in agriculture and industry, and in the overall rate of population growth and density.

Most of the 12 diet-adequate subregions are in the temperate zone. They account for over one-third of the world's population--more than a billion people. Their production of food and products they can trade for food assures their food supply both now and in the foreseeable future.

These regions generally possess a highly developed industrial and agricultural plant supported by highly skilled manpower and adequate resources of scientific and technical knowledge. This is reflected in per capita income. For 1960-62, the average annual per capita income of the people in these regions was estimated at \$1,074, excluding USSR and Eastern Europe.

For the nearly 2 billion people in the 10 diet-deficit subregions, incomes averaged only \$97 per person, excluding Communist Asia. The low purchasing power per person in these subregions makes it highly unlikely that they can increase imports of food beyond those projected in this study.

Data on the value of food production and trade further point up the differences. During 1959-61, the value of food production for the 12 diet-adequate subregions averaged \$103 per person compared with \$32 for the deficit subregions. The diet-adequate subregions imported almost \$12 of food per capita. The deficit areas' level was only \$1.66 per capita.

The limited amount of productive land available in many of the diet-deficit subregions

6/ These countries are shown as adequate on the map, although part of diet-deficit subregions.

further intensifies the problem of increasing the output of food. The diet-adequate subregions have only 17 persons per 100 acres of agricultural land compared with 53 in the deficit subregions. And the diet-adequate subregions have been able to achieve higher output per acre of agricultural land. Most of the countries have allocated substantial resources on an increasing scale for education, research, and development; and have provided for facilities and services for agriculture. This has meant greatly increased yields per

acre, greater output per unit of livestock, and higher output per hour of labor.

What is new and indeed monumental is that the diet-adequate subregions have not only assured the food supply for a billion people but in addition, have been able to send emergency food assistance to many of the less developed regions in the past decade. Significantly, the Bengal famine of 1942-43 in which over a million people died of starvation was the last great famine in the free world. (32)

Table 13.--Comparison of some important characteristics of the diet-adequate and diet-deficit subregions, average 1959-61 and projected 1970

Characteristic	Unit	Diet-adequate		Diet-deficit	
		1959-61	1970	1959-61	1970
Population:					
Number.....	Million	1,089	1,244	1,923	2,373
Distribution.....	Percent	36.2	34.4	63.8	65.6
Rate of growth, 1959-61 to 1970.....	Percent		1.3		2.1
Density per 100 acres.....	Person	17	..	53	..
Income: 1/					
Per capita.....	Dollar	1,074	1,302	97	115
Rate of growth, 1960-62 to 1970.....	Percent		1.9		1.7
Consumption:					
Value, per capita.....	Dollar	77	84	31	34
Calories.....	Calorie	2,941	3,023	2,033	2,203
Protein, total.....	Gram	84.0	86.4	52.4	57.4
animal.....	Gram	38.8	43.1	7.2	8.6
pulse.....	Gram	5.0	5.3	8.7	10.0
Fat.....	Gram	94.5	103.8	30.0	34.8
Calories from high carbohydrate foods.....	Percent	60	56	78	78
Food production:					
Value, total.....	Bil. dol.	111.9	140.9	61.6	85.9
per capita.....	Dollar	103	113	32	36
Distribution.....	Percent	64.5	62.1	35.5	37.9
Per capita (1952-54 = 100).....	Index	112	124	100	110
Total (1952-54 = 100).....	Index	122	155	117	159
Food trade:					
Value, exports.....	Mil. dol.	11,480	15,972	4,318	5,644
imports.....	Mil. dol.	12,547	15,128	3,185	4,613
Distribution, exports.....	Percent	72.7	73.9	27.3	26.1
imports.....	Percent	79.8	76.6	20.2	23.4
Per capita, exports.....	Dollar	10.54	12.84	2.25	2.38
imports.....	Dollar	11.52	12.16	1.66	1.94

1/ Base period, 1960-62. Excludes Eastern Europe, USSR and Communist Asia.

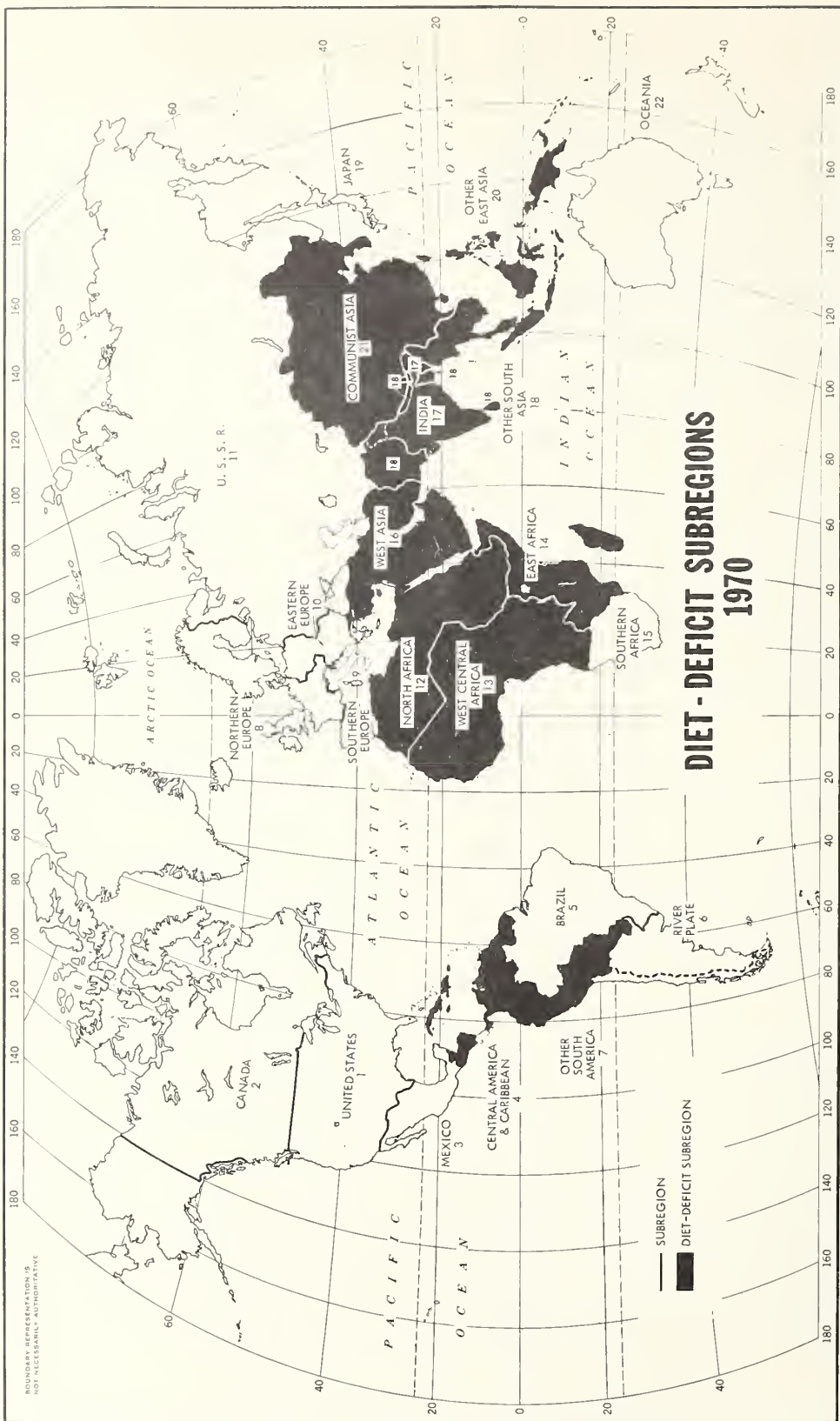


FIGURE 3

Requirements to Fill the Food Gap

Progress in filling the food gap will be made by increasing the production and imports of a wide variety of food products. However, certain types of food products probably will be of major importance--those which are cheap, easily transported and stored, convenient and widely used and accepted in the diets of many people throughout the deficit areas. Such products are the grains, pulses, and vegetable oils. By 1970 and thereafter there also will likely be increasingly widespread use of nonfat dry milk and fish products to fill the vital animal protein. Therefore, for convenience in understanding and roughly measuring the total deficit, subregional deficits are expressed in quantities of selected commodities which may be used to fill the nutritional deficits. ^{7/} These quantities of commodities are priced at current U.S. average export prices to give a very rough estimate of the cost of filling the deficit.

Energy Deficits

In determining the requirements to fill the food gap, the hunger needs were considered first by filling the energy requirements in terms of calories; then the other nutritional

deficits of protein and fat were considered. Grains constitute the ideal commodities to fill the energy deficit, both from the point of view of local production and ease of transport.

In calculating the amount of wheat, rice, and other grains required to fill the energy deficit, the same proportion of the calorie gap was allocated to these grains as prevailed in the consumption ratio of grains projected for 1970 in each subregion. It is projected that 54 million metric tons of grain will be required to fill the deficit by 1970--9.1 million tons of wheat, 33.3 million tons of rice, and 11.3 million tons of other cereals. This may be compared with the deficit of 29 million tons as projected in the first World Food Budget for 1966 ^{8/} and the actual deficit of 87 million tons during 1959-61. Excluding Communist Asia, which accounts for more than two-thirds of the deficit, the magnitude is not nearly as great. It is projected at 16 million metric tons of grains compared with an actual deficit of 32 million during 1959-61. (A deficit of 26 million tons was projected for 1966 for the free world in the first World Food Budget.) (32)

^{7/} Requirements are measured against the average of the deficit countries within the subregion and not the sub-regional average.

^{8/} The deficit measured in wheat in the first World Food Budget was for "remaining calorie and other protein deficits".

Table 14.--Grains required to fill energy deficits, by subregion, 1970

Subregion	Population	Calories per person per day to be filled by			Grains required			
		Wheat	Rice	Other	Wheat	Rice	Other	Total
	1,000	Number	Number	Number	1,000 metric tons	1,000 metric tons	1,000 metric tons	1,000 metric tons
Central America and Caribbean.....	42,041	47	63	96	243	403	476	1,122
Other South America....	67,798	51	25	44	425	258	352	1,035
North Africa.....	105,421	23	3	30	298	48	373	719
East Africa.....	61,056	1	1	8	4	11	60	75
West Asia.....	101,012	83	6	15	1,031	92	179	1,302
India.....	536,646	17	42	21	1,122	3,426	1,330	5,878
Other South Asia.....	162,539	22	46	4	440	1,136	77	1,653
Other East Asia.....	315,044	3	76	14	116	3,639	520	4,275
Communist Asia.....	846,768	52	189	79	5,416	24,326	7,894	37,636
Total or average.....	2,238,325	33	98	43	9,095	33,339	11,261	53,695

Table 15.--Nonfat dry milk or fish protein concentrates required to fill animal protein deficits, by subregion, 1970

Subregion	Animal protein deficit <u>1/</u>	Foods required	
		Nonfat dry milk or	Fish protein concentrates
	<u>Grams</u>	1,000 metric tons	1,000 metric tons
Central America and Caribbean.....	0.4	17	8
West Central Africa.....	3.8	518	239
East Africa.....	0.2	12	6
India.....	2.2	1,197	553
Other East Asia.....	2.6	831	383
Communist Asia.....	4.6	3,950	1,823
Total or average.....	3.3	6,525	3,012

1/ Per person per day.

Table 16.--Dry beans and peas or soygrits required to fill pulse and other protein deficits, by subregion, 1970

Subregion	Pulse deficit <u>1/</u>	Other protein deficit <u>1/</u> <u>2/</u>	Foods required	
			Dry beans and peas	or Soygrits <u>3/</u>
	<u>Grams</u>	<u>Grams</u>	1,000 metric tons	1,000 metric tons
Central America and Caribbean.....	0.8	0	55	26
North Africa.....	0.9	0	156	74
West Central Africa.....	2.0	1.5	773	365
East Africa.....	0.2	0.2	40	19
West Asia.....	2.1	0	349	165
Other South Asia.....	3.9	0	1,042	493
Other East Asia.....	3.1	5.2	4,299	2,032
Total or average.....	2.4	2.4	6,714	3,174

1/ Per person per day.

2/ Remaining deficit in other proteins after taking into account the protein added by grains used to fill the calorie deficit.

3/ Defatted

Table 17.--Vegetable oils required to fill fat deficits, by subregion, 1970

Subregion	Fat deficit <u>1/</u>	Vegetable oil required
	<u>Grams</u>	1,000 metric tons
Central America and Caribbean.....	0.4	6
North Africa.....	1.5	59
West Central Africa.....	0.1	5
East Africa.....	1.4	31
West Asia.....	1.2	44
India.....	4.4	864
Other South Asia.....	8.7	519
Communist Asia.....	5.1	1,573
Total or average.....	4.3	3,101

1/ Per person per day. Remaining deficit after taking into account the fat added by grains used to fill the calorie deficit.

To fill the calorie deficit by 1970, world grain production would have to be increased 4.9 percent above the level projected for 1970; wheat 3.3 percent, rice 11.1 percent, and other grains 2.1 percent.

The energy deficit is centered in the subregions of the Far East, accounting for 92 percent of the estimated grain requirement. However, the bulk of this results from the disastrous failure of food production in Mainland China. The first World Food Budget was based on food balances for 1958, the year of China's "Great Leap Forward". The calorie level for China was estimated at 2,200, with only a small energy deficit. By 1959-61 the level had fallen to less than 1,800 calories and is projected to recover only to 2,030 by 1970.

The energy deficit for the rest of the Far East is represented by 25 million metric tons of grain in 1959-61, falling to 12 million in 1970.

The deficit is huge in the Far East because populations are so large. On a per capita basis the picture changes somewhat:

<u>Subregion</u>	Grain per capita required to fill the energy deficit
	<u>Kilograms</u>
Central America and Caribbean	27
Other South America	15
North Africa	7
East Africa	1
West Asia	13
India	11
Other South Asia	10
Other East Asia	13
Communist Asia	56

Some of the deficit countries in Latin America will find it as difficult to provide an adequate diet for their people as those in the Far East because their economies and resources for production and distribution of food are relatively smaller.

Other Nutritional Deficits

The amounts of protein and fat supplied by grains required to meet the calorie gap were subtracted from the other protein and fat deficits before measuring the magnitude of these deficits. However, the additional calories supplied by filling the deficits for protein and fat were not considered in reducing the calorie deficit, nor was the fat content of foods utilized to fill the protein deficit considered in reducing the fat deficit.

The animal protein deficit is filled alternatively by nonfat dry milk and fish protein concentrates. These two products were selected because of the widespread use and availability of nonfat dry milk and the availability of fish products in some regions.

According to the projections, 6.5 million metric tons of nonfat dry milk or 3.0 million tons of fish protein concentrates will be required to fill the animal protein deficit. This compares to a deficit equivalent to 8.7 million tons of nonfat dry milk in 1959-61. This deficit is considerably greater than that projected in the World Food Budget for 1966. This results largely from a higher animal protein standard and the serious situation in Communist Asia.

The pulse and remaining other protein deficit (after considering the protein added from grains), is filled alternatively by dry beans and peas and soybean protein concentrates.

By 1970, 6.7 million metric tons of dry beans and peas or 3.2 million tons of soybean protein concentrate (soygrits) will be required to fill the pulse and other protein deficit. This compares to a deficit equivalent to 7.0 million tons of dry beans and peas in 1959-61. Again, the bulk of this deficit is accounted for by subregions in the Far East, although neither India nor Communist Asia are deficit in these proteins. West Central Africa will require large quantities of these foods--relative to its population--to fill the protein deficit. The

quantity of dry beans and peas is much larger than that projected in the World Food Budget for 1966. This is mainly due to the higher combined animal and pulse protein standard and the inclusion of other protein deficit.

The remaining fat deficit (after considering the fat added from grains) will require 3.1 million metric tons of vegetable oil. The subregions of the Far East account for most of the deficit and Communist Asia alone accounts for about one-half of the total fat deficit. The fat deficit was equivalent to 8.1 million tons of vegetable oil in 1959-61; two-thirds of it in Communist Asia.

Cost of Filling the Deficit

Physical quantities of the various commodities required to fill the food gap were multiplied by U.S. export prices for 1963 to obtain the cost of the deficit of these food items in 1970. This more clearly demonstrates the magnitude of the deficit by subregion and the total for each of the commodities.

The value of grains required to fill the calorie deficit is projected to total \$4.5 bil-

lion--wheat \$0.6 billion, rice \$3.3 billion, and other grains \$0.6 billion.

The cost of filling the animal protein deficit is \$1.2 billion if nonfat dry milk is used or \$1.0 billion if fish protein concentrate is used. The cost of filling the pulse and other protein deficit is \$0.5 billion using dry beans and peas or \$0.4 billion using soygrits. The cost of filling the fat deficit with vegetable oil is projected to total \$0.7 billion.

The total cost of the food items required to fill the food gap for all of the deficit subregions in 1970 is over \$6.8 billion, using the value of soygrits (rather than dry beans and peas) and nonfat dry milk (rather than fish protein concentrate). Almost 93 percent of this cost is accounted for by regions in the Far East and nearly 63 percent by Communist Asia. The cost of the deficit in 1959-61 was \$10.7 billion (Figure 4).

However, reducing this cost to a per capita basis more clearly reflects the magnitude of the problem in filling the gap in each subregion. The average value of the deficit for the diet-deficit subregions is ex-

Table 18.--Cost of food items required to fill the nutritional gap, by subregion, 1970 ^{1/}

Subregion	Wheat	Rice	Other grain	Dry beans and peas	Soygrits	Nonfat dry milk	Fish protein concentrate	Vegetable oil
	----- Million dollars -----							
Central America and Caribbean.....	16.3	40.3	23.8	9.1	3.5	3.1	2.6	1.4
Other South America...	27.6	25.8	17.6	0	0	0	0	0
North Africa.....	19.4	4.8	18.7	25.7	10.0	0	0	14.2
West Central Africa...	0	0	0	127.5	49.3	93.2	78.9	1.2
East Africa.....	0.3	1.1	3.0	6.6	2.6	2.2	2.0	7.4
West Asia.....	67.0	9.2	9.0	57.6	22.3	0	0	10.6
India.....	72.9	342.6	66.5	0	0	215.5	182.5	207.4
Other South Asia.....	28.6	113.6	3.9	171.9	66.6	0	0	124.6
Other East Asia.....	7.5	363.9	26.0	709.3	274.3	149.6	126.4	0
Communist Asia.....	352.0	2,432.6	394.7	0	0	711.0	601.6	377.5
Total.....	591.6	3,333.9	563.2	1,107.7	428.6	1,174.6	994.0	744.3

^{1/} Value is based on 1963 U.S. export prices (f.o.b.), dollars per metric ton as follows: wheat 65, rice 100, other grains 50, dry beans and peas 165, soygrits 135 (USDA estimate), nonfat dry milk 180, fish protein concentrates 330 (USDA estimate), and vegetable oil 240.

pected to be about \$3.43 per person, ranging from a high of \$5.04 per person in Communist Asia to 27 cents in the East African region. The cost of the deficit in Central America and Caribbean, which is relatively low in total, amounts to \$2.10 per person (Figure 5).

Relating the value of the deficit in 1970 to the projected value of consumption (using 1959-61 average world prices), the deficit amounts to 8.1 percent of consumption in the diet-deficit subregions. The highest ratio is

in Communist Asia, where the deficit will amount to 16.6 percent of total consumption.

This deficit is of staggering dimensions. A tremendous effort will be required to fill the food gap remaining in 1970. However, in relation to total food supplies, the problem does not seem insurmountable. If world food supplies could be increased by 6 percent above the projections of this study, the deficit would disappear in all but one subregion.

Table 19.--Proportion of the cost of the deficit by subregion, 1970

Subregion	Cost of deficit <u>1/</u>	Distribution	Deficit per capita	Ratio of deficit to per capita food consumption
	<u>Million dollars</u>	<u>Percent</u>	<u>Dollars</u>	<u>Percent</u>
Central America and Caribbean.....	88.4	1.3	2.10	4.3
Other South America.....	71.0	1.0	1.05	1.9
North Africa.....	67.0	1.0	0.64	1.6
West Central Africa.....	143.7	2.1	1.07	3.2
East Africa.....	16.5	0.3	0.27	0.6
West Asia.....	118.0	1.7	1.17	2.6
India.....	905.0	13.2	1.69	5.3
Other South Asia.....	337.8	5.0	2.07	5.3
Other East Asia.....	821.3	12.0	2.61	6.1
Communist Asia.....	4,267.9	62.4	5.04	16.6
Total or average.....	6,836.0	100.0	3.43	8.1

1/ Wheat, rice, other grains, nonfat dry milk, soygrits, and vegetable oil.

Food deficit is centered in the Far East

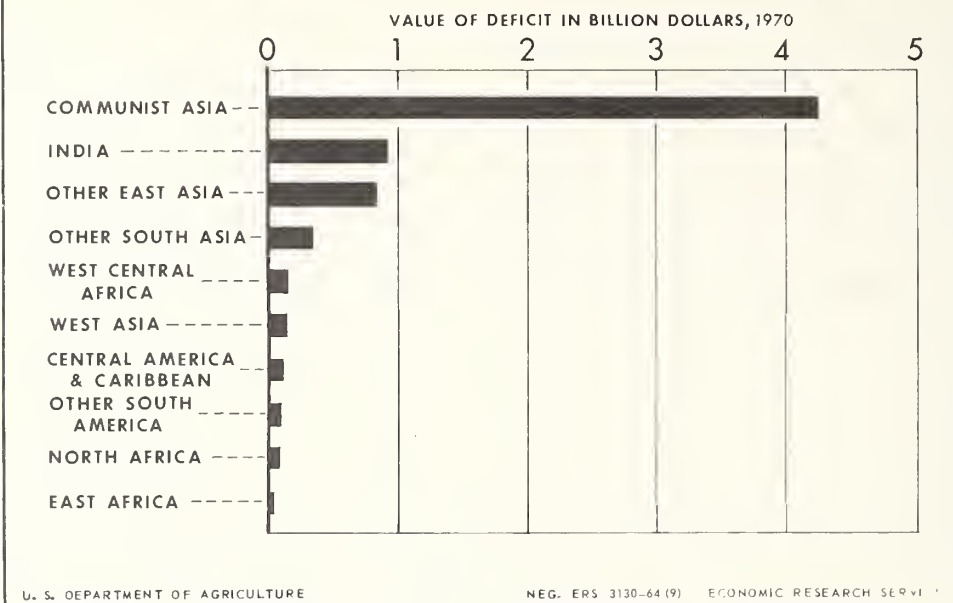


FIGURE 4

Per capita deficit high in Far East and Latin America

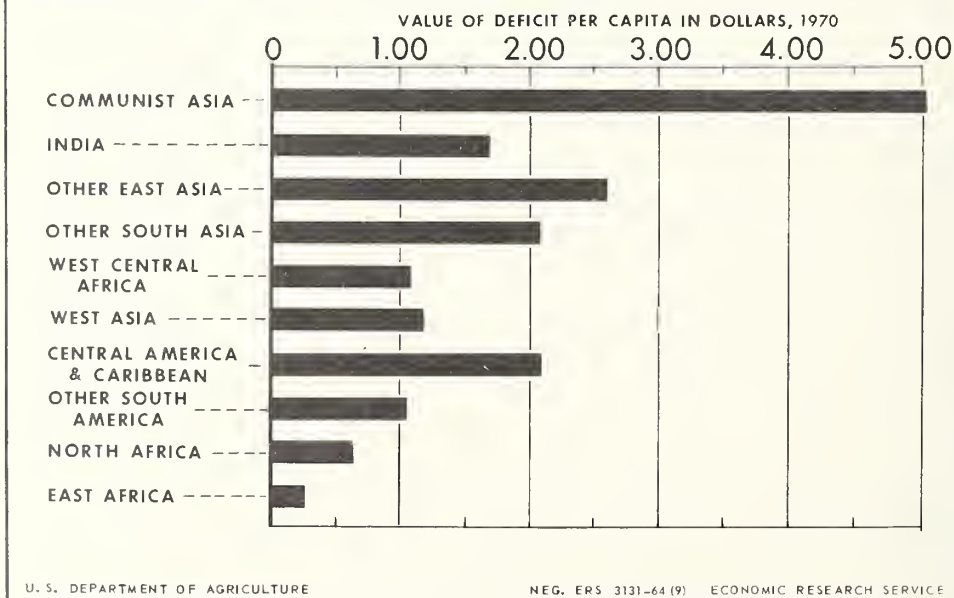


FIGURE 5

CLOSING THE FOOD GAP

Increasing Food Production

Trends in Food Production

The measurement of total and per capita food production presented in tables 20 and 21 has been based on the same series as the agricultural production indices published annually in the World Agricultural Situation. (33) For the United States, Canada, Oceania and Europe, including the USSR, the indices are for net output--that is, excluding feed inputs. For all other subregions the indices are in terms of gross output. References to annual rates of increase of total and per capita food production are in terms of three different and sometimes overlapping periods. Rates in the 23-year period, 1935-39 to 1959-61, are referred to as the long-term rates. The 7-year period, 1952-54 to 1959-61, is the short-term rate. Rates for the 10-year period, 1959-61 to 1970 are the projected rates. These are simple average rates representing only the average annual change between the base and the terminal period.

Long-term trends: Food production has increased since the late 1930's at an average annual rate of about 2 percent. The food output rate has increased about the same in the diet-deficit subregions as in the diet-adequate subregions. However, as is well known, population has expanded more rapidly in the diet-deficit subregions and food production per capita in the underfed part of the world has increased very slightly.

A grouping of the diet-deficit subregions into Communist and free world categories allows a more meaningful description of long-term trends in food production. The extremely low level of production in Communist Asia in the late 1950's and early 1960's obscures the upward trend in the free world diet-deficit subregions when these areas are combined into

one index. Also, for the free world subregions as a separate group, the statistical accuracy of the measurement of food production during 1959-61 is greater than for the total diet-deficit area due to the chaotic condition of Mainland China's agriculture during this period, for which accurate data are almost nonexistent.

Rough estimates of the U.S. Department of Agriculture put average per capita food production in Communist Asia in 1959-61 at some 8 percent below the 1935-39 level. However, this does not represent a long-run trend, since per capita food output in that region as late as 1958 was above prewar levels. Food production in the free world diet-deficit subregions showed an annual average long-term growth rate of 2.5 percent, exceeding that of the combined diet-adequate subregions by nearly 20 percent. But, in per capita production, the average long-run rate of increase in the free world diet-deficit subregions was only about 40 percent of that in the diet-adequate regions.

Conclusions which can be drawn from the long-term trends are not optimistic, especially for diet-deficit subregions of Asia. Furthermore, an average growth rate of less than 1 percent per year in per capita food production for the diet-adequate subregions seems somewhat low, even with the low demand elasticity of food in economically developed countries. The only favorable long-term trend was in Latin America which, as a region, tended to have the largest total and per capita increases. Only in the River Plate subregion, with above-average agricultural resources, was the situation unfavorable over this period.

Short-term trends: The rate of increase in food output since the early 1950's has been

accelerated to 2.8 percent a year--or approximately 30 percent over the long-run rates--while the rate of population growth has risen 25 percent. If Communist Asia were excluded, the gains would be more favorable. The short-run rate of increase in per capita food output has approximately doubled over the long-run rate for both the free world diet-deficit subregions and the diet-adequate subregions. At least part of the gain in per capita production is the result of recovery from the effects of World War II, which were still affecting food production in the diet-adequate subregions of Eastern Europe and Japan in the 1952-54 base period.

A small amount of the gain in short-run rates for free world diet-deficit subregions

may be the result of including the rapidly increasing East Africa subregion, which was not included in the long-term rates due to a lack of data.

The short-term growth rate in per capita food output for the free world diet-deficit subregions is only slightly less than the long-term rate for the diet-adequate subregions. This seems meaningful. It means increased food availabilities and economic growth in the underdeveloped regions, although much more rapid growth would be necessary to provide an adequate diet. The significance of the short-term rate is enhanced because the densely populated subregions of Asia, especially India and East Asia, were instrumental in raising the average growth rate.

Table 20.--Trends in food production by subregion, 1935-39, 1952-54, 1959-61 average; 1962, 1963 annual; and projected 1970 (1952-54 = 100)

Subregion	Total production					Average annual change ^{1/}		
	1935-39	1959-61	1962	1963	1970	1935-39 to 1959-61	1952-54 to 1959-61	1959-61 to 1970
						Percent	Percent	Percent
<u>Diet-adequate</u>								
United States.....	67	117	119	124	142	3.19	2.41	2.12
Canada.....	70	104	121	132	134	2.12	0.60	2.83
Mexico.....	52	157	168	186	236	8.68	8.17	4.99
Brazil.....	58	141	151	146	195	6.15	5.87	3.85
River Plate.....	91	99	96	110	126	0.39	-0.18	2.78
Northern Europe.....	79	116	124	125	137	1.98	2.25	1.83
Southern Europe.....	85	119	123	123	155	1.75	2.71	3.00
Eastern Europe.....	119	128	125	124	151	0.32	4.03	1.82
USSR.....	102	135	141	135	191	1.40	4.94	4.22
Japan.....	83	146	162	158	206	3.28	6.56	4.15
Oceania.....	98	118	131	132	152	0.92	2.59	2.91
Southern Africa.....	n.a.	128	143	n.a.	188	..	4.01	4.70
Total.....	82	122	127	127	155	2.10	3.11	2.75
<u>Diet-deficit</u>								
Central America and Caribbean.....	58	120	100	96	139	4.66	2.86	1.58
Other South America.....	60	123	130	131	173	4.50	3.28	4.10
North Africa.....	68	110	119	122	142	2.70	1.48	2.84
West Central Africa.....	n.a.	119	123	125	152	..	2.66	2.78
East Africa.....	n.a.	144	153	158	203	..	6.23	4.12
West Asia.....	70	116	124	128	143	2.84	2.33	2.33
India.....	80	126	128	128	167	2.47	3.73	3.23
Other South Asia.....	82	122	124	129	156	2.15	3.16	2.79
Other East Asia.....	93	128	140	140	172	1.63	4.00	3.42
Total Free World.....	78	123	127	129	160	2.50	3.27	3.04
Communist Asia.....	79	104	109	109	155	1.38	0.59	4.92
Total.....	78	117	121	123	159	2.10	2.41	3.58
World.....	81	120	125	125	156	2.10	2.85	3.04

^{1/} Calculated from food production aggregates.
n.a. = not available.

Although the period since 1961 has been too short to reveal any definite trends, the developments in per capita agricultural production temper somewhat the optimism induced by the short-term rates. Per capita production since 1959-61 has remained unchanged or declined in nearly all of the diet-deficit subregions and in half of the diet-adequate subregions.

Population pressure has continued and in key diet-deficit subregions new cropland becomes less available with each succeeding year. However, as has been documented in the last two issues of the World Agricultural situation, reverses in 1962 and 1963 were to a large extent the result of unfavorable weather. (33)

Projected trends: The projected rates of change in per capita production represent projections by country and commodity. These projections assumed no aggregate production restraints and were, in general, heavily influenced by demand projections.

The significant feature of the projections to 1970 is that the annual rate of increase in per capita food production for the free world diet-deficit subregions in the 1960's is expected to only approximate the long-term average rate. The higher rate of increase for the 1960's than in the 1950's for the combined diet-deficit subregions is heavily weighted by the expected recovery of Mainland China from the critically low level to which it fell during the base period.

Table 21.--Trends in food production per capita by subregion (1952-54 = 100)

Subregion	Per capita production					Average annual change ^{1/}		
	1935-39	1959-61	1962	1963	1970	1935-39 to 1959-61	1952-54 to 1959-61	1959-61 to 1970
						Percent	Percent	Percent
<u>Diet-adequate</u>								
United States.....	83	104	102	104	110	1.05	0.54	0.62
Canada.....	91	86	96	103	86	-0.25	-2.00	0.02
Mexico.....	79	127	128	138	140	2.60	3.88	1.03
Brazil.....	76	114	114	107	116	2.10	1.98	0.20
River Plate.....	125	88	82	92	94	-1.29	-1.77	0.76
Northern Europe.....	92	114	119	119	125	0.99	1.91	1.05
Southern Europe.....	99	117	118	118	141	0.81	2.37	2.08
Eastern Europe.....	118	121	116	114	131	0.09	2.95	0.87
USSR.....	104	123	123	116	152	0.74	3.16	2.45
Japan.....	102	135	149	144	175	1.37	5.08	2.91
Oceania.....	127	102	109	107	107	-0.82	0.32	0.51
Southern Africa.....	n.a.	108	116	n.a.	127	..	1.17	1.78
Total.....	94	112	113	111	124	0.80	1.70	1.11
<u>Diet-deficit</u>								
Central America and Caribbean.....	78	101	80	75	90	1.29	0.15	-1.10
Other South America.....	83	102	102	100	109	0.88	0.22	0.72
North Africa.....	92	94	97	98	97	0.09	-0.86	0.33
West Central Africa.....	n.a.	103	102	102	106	..	0.40	0.33
East Africa.....	n.a.	120	120	122	134	..	2.74	1.24
West Asia.....	86	99	101	102	96	0.61	-0.10	-0.31
India.....	99	110	106	104	117	0.45	1.38	0.66
Other South Asia.....	99	103	100	102	103	0.24	0.48	-0.05
Other East Asia.....	124	108	112	109	113	-0.60	1.07	0.49
Total Free World.....	97	105	104	103	109	0.32	0.74	0.32
Communist Asia.....	96	88	90	89	111	-0.37	-1.63	2.54
Total.....	97	100	99	98	110	0.12	-0.04	1.03
World.....	97	105	105	104	114	0.28	0.73	0.85

^{1/} Calculated from food production aggregates.

n.a. = not available.

Probably the most important factor in the projection for 1970 per capita production, especially in the deficit regions, is the expected continuing increase in the rate of population growth. Also, current government policies in the diet-deficit subregions indicate that although some emphasis will be placed on agricultural development it will not be enough to significantly increase crop yields. In addition, the possibility of a substantial expansion of crop area in Asia seems improbable. Per capita incomes are low and, although they are rising slowly in the diet-deficit subregions, government policies to maintain low food prices make it seem unlikely to assume any significant stimulus to increased production from increased effective demand during this period.

Projections of per capita production for some subregions vary from short-term trends. The forces resulting in these differences should be discussed.

For the Other South America subregion, possibilities for an expansion of crop area, intensification of production, and the influence of the Alliance for Progress all seem to justify some optimism. However, for Brazil and Central America and Caribbean, political instability and overall economic problems of recent years suggest pessimism. Mexico will have difficulty maintaining its tremendous growth rate, because much of it came from increased acreage which is not now so readily available. However, there is evidence of increases in yields. The River Plate countries should recover somewhat from the long downward trend.

In Northern Africa, more intensive cultivation in Egypt indicates the possibility of some acceleration in food output. In East Africa, some temporary deceleration in the rate of increase in per capita food output is expected due to recent political changes. West Central Africa could increase output substantially faster than projected if there were a large increase in crop area, but the necessary preconditions probably will not be

satisfied in the near future. In Southern Africa, increased output of cash crops by African farmers is taking place. Further increases in grain yields are expected.

The projected rate of increase in Japan, when converted to a net basis, is about the same as officially planned by that country. The higher rate of increase in Canada largely results from expanded wheat acreage, reflecting the recent level of trade with the USSR and Mainland China.

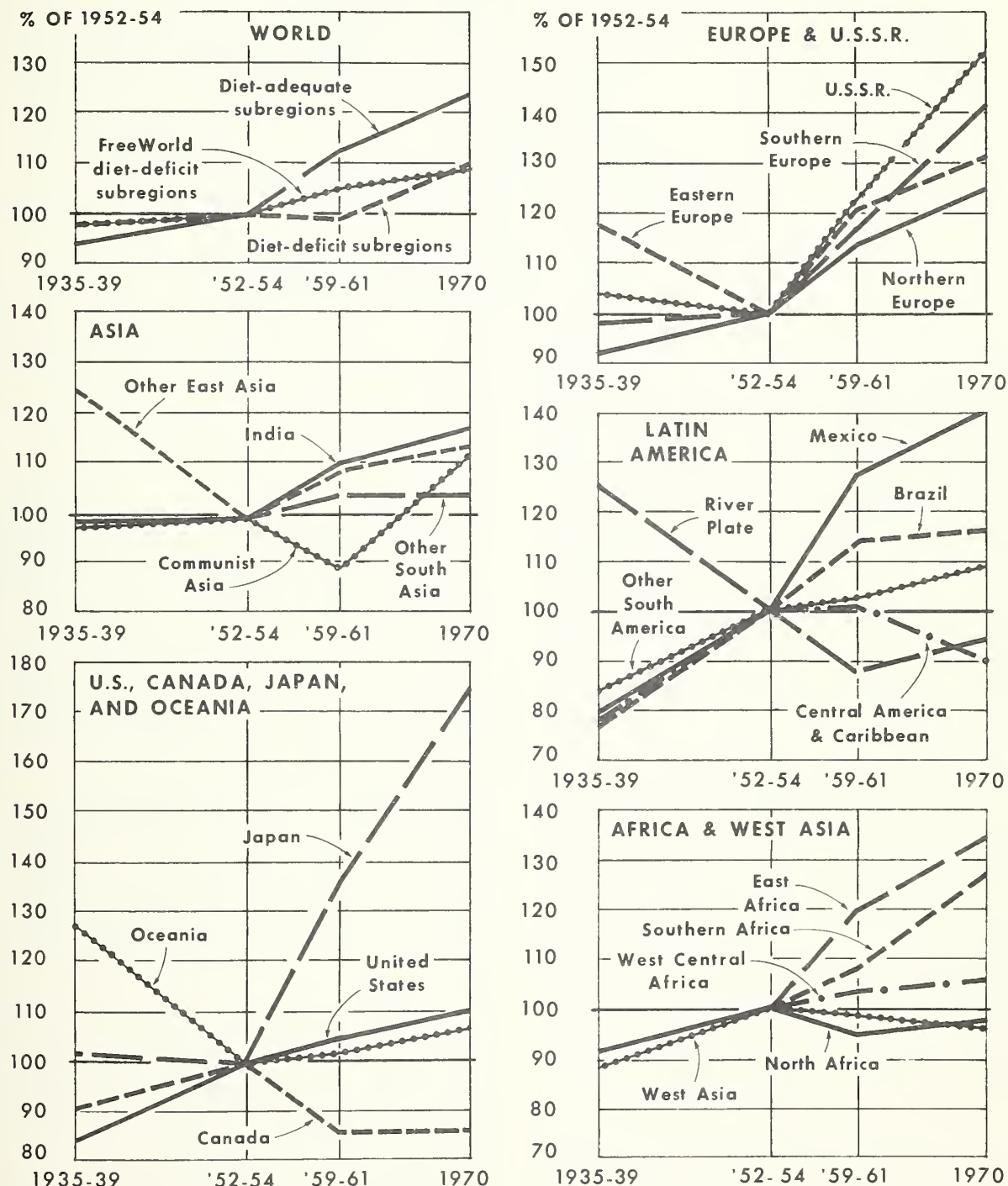
In India, gains in production must come largely from higher yields resulting from greater use of fertilizer and expanded irrigation. However, the rate of improvement achieved in the 1950's probably will not be maintained during the 1960's. Food production in Other South Asia, principally Pakistan, will not quite keep pace with population. This area must rely on increased food imports to improve the diet. Other East Asia continues to increase production, but difficulty in expanding acreage will slow the rate.

Projections to 1970 for the Soviet Union are generally optimistic, although they indicate a somewhat slower growth rate than occurred in the short-run, when the sown area was increased 30 percent. Four major assumptions were made for USSR projections: (a) The official de-emphasis on agriculture during 1959-61, which was reflected in reduced deliveries of machinery and slower rates of increase in capital, was reversed in 1962-63 and is to continue throughout most of the decade; (b) about 75 percent of the planned fertilizer deliveries to agriculture will be realized, and the fertilizer responses projected recently by a Soviet scientist will be obtained; (36) (c) weather conditions will be normal; and (d) no further increase in acreage over 1963 expected, but continued emphasis on increased yields. These projections are substantially below present Soviet plans for 1970.

The short-run growth rate in Eastern Europe was heavily influenced by a low base

Food production per person slows during 1960's

INDICES OF PER CAPITA FOOD PRODUCTION



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FIGURE 6

resulting from World War II and political change. Per capita agricultural production has either remained unchanged or declined every year since 1959.

Production increases for the United States, Western Europe, and Oceania are projected at about the same rate as the short-term trends.

Production Projections

Commodities: Hereofore, the discussion of the projections has been in terms of aggregates and their relative change. A general picture of the physical magnitudes and absolute changes by commodity groups is presented in figure 7. (Detailed information by subregion is available in Appendix tables 37 and 38.) In general, no major shift in emphasis among grains has been projected. However, Canada is expected to increase wheat relatively more than other grains, while efforts to increase grain production in Northern and Southern Europe are expected to be focused more heavily on feed grains than in the past.

In the diet-adequate subregions, the production pattern is heavily weighted toward livestock. In the diet-deficit subregions, grains, other starchy crops, vegetables, fruits, and pulses are much more predominant in the production pattern. These patterns were not altered appreciably in either area in the 1970 projections, with the importance of grains diminishing somewhat in both areas and most other commodities gaining slightly.

In the diet-adequate subregions of Brazil, Mexico, and River Plate, and Japan, the relative importance of grains, other starchy crops, and livestock products in the production pattern

Production to rise faster in adequate than in deficit areas

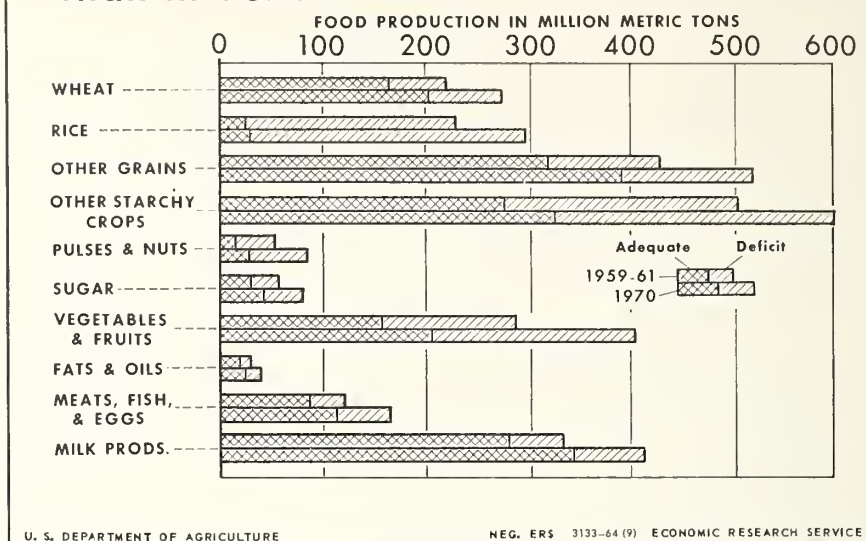


FIGURE 7

more closely resembles that of the diet-deficit subregions. The production in North and East Africa tends to resemble that of the diet-adequate subregions.

The Central America and Caribbean subregion has a production pattern distinctly different from all others. Sugar accounts for over 50 percent of food production.

Value: Expressing total world food production in dollar value has some shortcomings. However, to many readers, this is probably the most meaningful form. Also, the results obtained were not substantially different from those calculated with regional price relatives.

World per capita value of food production in 1959-61 was \$58. A great disparity exists, however, in the per capita value of food production in the subregions. The level in the diet-adequate subregions is three times that of the diet-deficit subregions. Per capita food production in terms of dollar value is influenced by many factors. Basic among them is population density and the importance of

expensive commodities, such as meat, in the production pattern. Japan's per capita food production is the lowest in the diet-adequate subregions, despite very high per acre yields, and indicates its dependence on imports for an important part of its food supply. The relatively high per capita production in Central America and the Caribbean subregion reflects the large food exports.

The combined diet-deficit subregions accounted for slightly more than one-third of total world food production during 1959-61, while this area has over two-thirds of the population. The United States, Canada, and

Europe (excluding USSR) produce about 43 percent of the world's food on only 19 percent of the total agricultural land with only 21 percent of the population. But Europe is still a net food importer.

Possibilities and Problems of Increasing Production

A full discussion of the possibilities and problems of increasing food production is beyond the scope of this study. The following is more in the nature of a note on the subject, covering some of the more important points which influenced this study.

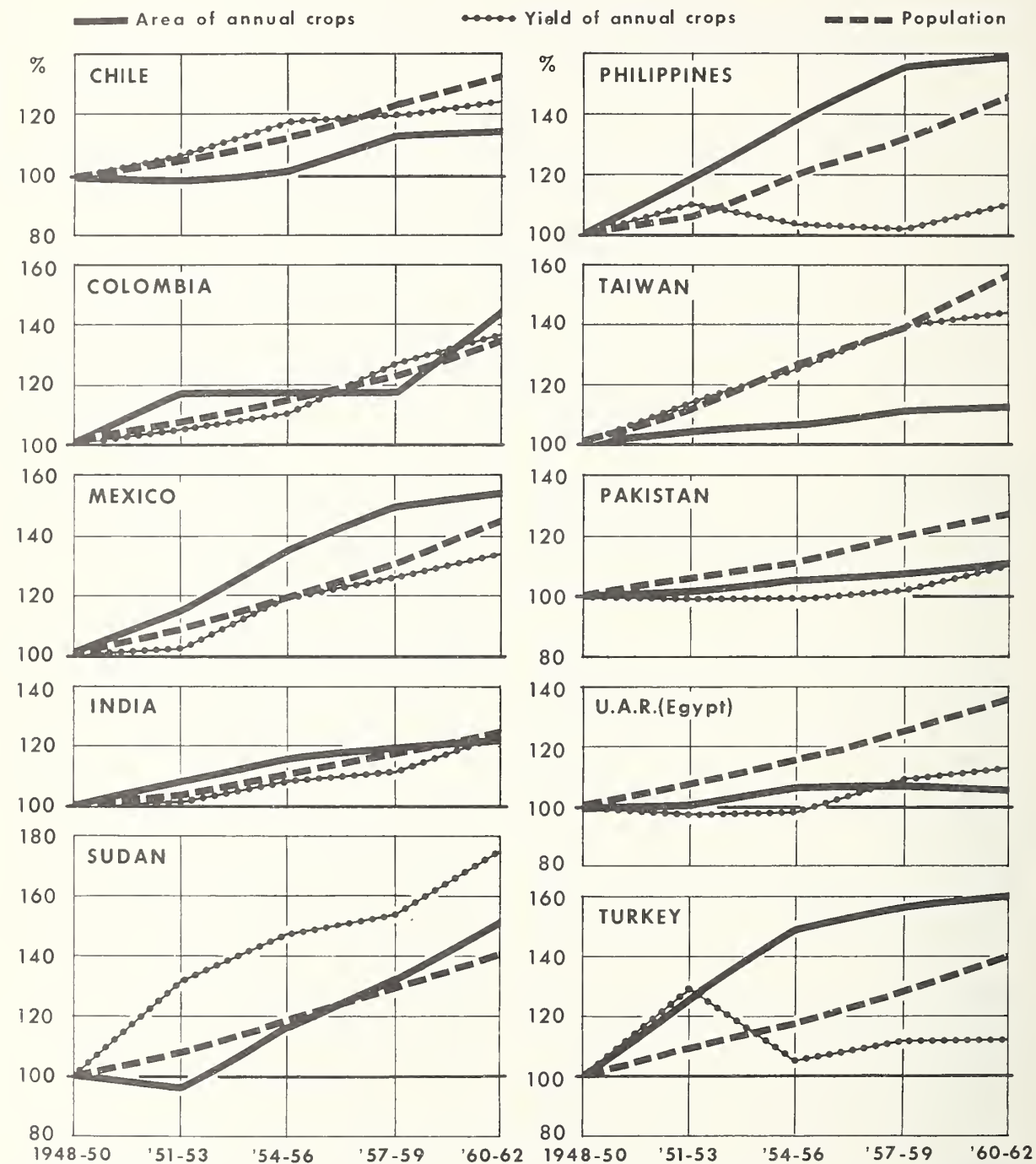
Table 22.--Value of agricultural food production, total, distribution, and per capita, by subregion, average 1959-61 and projected 1970

Subregion	Total value 1/		Distribution		Per capita	
	1959-61	1970	1959-61	1970	1959-61	1970
	Million dollars	Million dollars	Percent	Percent	Dollars	Dollars
<u>Diet-adequate</u>						
United States.....	28,856	33,746	16.6	14.9	160	162
Canada.....	3,089	3,880	1.8	1.7	173	169
Mexico.....	1,754	2,506	1.0	1.1	50	53
Brazil.....	4,498	6,327	2.6	2.8	64	66
River Plate.....	3,439	4,411	2.0	1.9	151	163
Northern Europe.....	22,770	26,626	13.1	11.7	108	118
Southern Europe.....	6,853	8,902	4.0	3.9	71	85
Eastern Europe.....	12,829	15,075	7.4	6.7	110	118
USSR.....	20,016	28,922	11.5	12.8	93	118
Southern Africa.....	1,257	1,755	0.7	0.8	71	80
Japan.....	3,368	4,608	2.0	2.0	36	45
Oceania.....	3,135	4,131	1.8	1.8	247	266
Total or average.....	111,864	140,889	64.5	62.1	103	113
<u>Diet-deficit</u>						
Central America and Caribbean...	2,274	2,711	1.3	1.2	70	64
Other South America.....	2,804	3,979	1.6	1.8	54	59
North Africa.....	3,267	4,225	1.9	1.9	39	40
West Central Africa.....	4,272	5,633	2.5	2.5	39	42
East Africa.....	2,116	2,842	1.2	1.2	44	47
West Asia.....	3,835	5,053	2.2	2.2	48	50
India.....	12,148	16,271	7.0	7.2	28	30
Other South Asia.....	4,070	5,677	2.4	2.5	32	35
Other East Asia.....	9,237	12,515	5.3	5.5	38	40
Communist Asia.....	17,573	26,975	10.1	11.9	25	32
Total or average.....	61,596	85,881	35.5	37.9	32	36
World.....	173,460	226,770	100.0	100.0	58	63

1/ Unit value weights are given in the Appendix. Fish is excluded from value of production.

Production gains result from area and yield increases

INDICES OF POPULATION, AREA, AND YIELD 1948-50 = 100



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FIGURE 8

The process of projecting food production is in essence, first, an evaluation of the extent to which a given set of resources are likely to be more fully utilized, and second, the possibilities for expanding the resource base.

The following are generalizations relevant to the problem as it is expected to develop by 1970:

A. Resources necessary for man to feed himself adequately appear to exist, but further rapid growth of population will tend to diminish the adequacy of these resources in the absence of some breakthrough. In Asia the density of population in relation to land resources is causing apprehension to thoughtful leaders. (12)

B. The agricultural population constitutes one-half to three-fourths of the total population in most of the less developed countries. This situation will persist for some time. (21)

C. In overpopulated countries with low per capita incomes, a mere reorganization of production units is likely to make little contribution to increased production.

D. The task of increasing food production must concentrate heavily upon increasing grain production. Grains occupy about 70 percent of the world harvested area, supply directly more than one-half of man's food energy, and in addition contribute greatly to the production of livestock products. Increased grain production in most of the developed regions since 1934-38 can be attributed mainly to increased yields. On the other hand, in the less developed regions about 75 percent of increased production since 1934-38 has come from increased area. (2)

E. Some of the increased crop area has resulted from expanding the arable land base; however much of it has come from multiple cropping.

F. The productivity of both agricultural land and labor varies widely among major geographic regions. Variation in labor productivity is, however, much greater than variation in land productivity. (2)

Increasing area and yields: Increases in the area of land used for food production have in the past usually been related to increases in population. Today, only about 30 percent of the world's land with food production possibilities is utilized. (12) But the most accessible and perhaps the most productive lands are in use. Political, economic, and physical realities are prominent barriers to utilizing land resources more fully to overcome hunger.

A clear perspective of the past is not available as a tool for projecting future increases in crop area. This is because of a lack of long-time series of statistics for large areas of the world.

A study is now underway in the Foreign Regional Analysis Division to analyze trends in agricultural production in 30 countries since World War II. Trends of population, area, and yields for 12 of the underdeveloped countries are shown in figure 8. Incomplete results for the 30 countries permit some tentative generalizations: 9/

A. The crop area, including multiple cropping, tended to increase, even in densely settled countries like India and Egypt.

B. The crop area tended to increase faster than population in thinly populated countries.

C. The crop area tended to increase at a decreasing rate in the more densely populated countries.

9/ This study is part of the project "Factors Associated with Differences and Changes in Agricultural Output and Productivity in Underdeveloped Countries", sponsored by the Agency for International Development, U. S. Department of State.

In India for example, the crop area has increased at a decreasing rate. It will likely become increasingly difficult for India to expand its land base and, therefore, future increases in production will likely have to come largely from increases in yields per acre. India's Third Five-Year Plan confirms this situation.

In some of the countries, increased area resulted in decreased yields, partly because of bringing less productive land under cultivation. In other countries, area and yield both increased. In Mexico and India, area and yield increased at about the same rate. This

reflects the fact that a substantial portion of their new lands were irrigated.

Increases in grain production from area and yield: Grain production is projected to increase over 24 percent by 1970, resulting from a 8 percent increase in grain area and a 14 percent increase in grain yield. Thus, 30 percent of the increased production is expected to result from expanded acreage and 70 percent from improved yields. In the diet-adequate subregions about 20 percent of the increase in grain production is expected to result from increased area with the remaining 80 percent coming from increased

Table 23.--Grain area, yield and production, average 1959-61 and projected 1970

Subregion	Area		Yield ^{1/}		Production		Change in production 1959-61 to 1970		
	1959-61	1970	1959-61	1970	1959-61	1970	Total	From change in area	From change in yield
	Million acres	Million acres	Kgs. per acre	Kgs. per acre	Million m.t.	Million m.t.	Million m.t.	Percent ^{1/}	Percent ^{1/}
<u>Diet-adequate</u>									
United States	176.5	168.8	972	1,200	171.5	202.6	31.1	-24	124
Canada	43.0	45.4	507	640	21.8	29.0	7.2	17	83
Mexico	18.9	24.3	369	440	7.0	10.7	3.7	53	47
Brazil	26.9	34.6	508	550	13.7	19.1	5.4	73	27
River Plate	26.9	27.5	559	700	15.0	19.3	4.3	9	91
Northern Europe	56.0	52.9	1,145	1,410	64.1	74.6	10.5	-34	134
Southern Europe	42.9	40.8	587	688	25.1	28.0	2.9	-42	142
Eastern Europe	80.5	81.3	736	805	59.3	65.4	6.1	9	91
USSR	275.8	304.0	355	427	97.9	129.7	31.8	32	68
Southern Africa	20.3	22.0	274	398	5.6	8.8	3.2	15	85
Japan	12.1	10.7	1,646	1,910	19.9	20.5	0.6	-388	488
Oceania	20.2	24.4	475	558	9.6	13.6	4.0	50	50
Total	799.9	836.8	638	742	510.5	621.3	110.8	21	79
<u>Diet-deficit</u>									
Central America and Caribbean	6.4	8.0	456	475	2.9	3.8	0.9	83	17
Other South America	27.4	32.1	217	250	5.9	8.0	2.1	49	51
North Africa	35.9	47.8	418	420	15.0	20.1	5.1	98	2
West Central Africa	26.5	32.4	465	469	12.3	15.2	2.9	95	5
East Africa	14.0	17.3	696	740	9.8	12.8	3.0	75	25
West Asia	70.8	77.5	328	370	23.3	28.7	5.4	40	60
India	221.8	241.2	372	430	82.6	103.7	21.1	34	66
Other South Asia ...	53.0	64.4	503	534	26.7	34.4	7.7	74	26
Other East Asia	106.7	117.5	492	588	52.5	69.1	16.6	32	68
Total ^{2/}	562.5	638.2	411	463	231.0	295.8	64.8	48	52
World ^{2/}	1,362.4	1,475.0	544	622	741.5	917.1	175.7	30	70

^{1/} Calculated from unrounded data.

^{2/} Excluding Communist Asia.

yields. In the diet-deficit subregions (excluding Communist Asia) the area-yield contribution is expected to be more nearly 50-50. In 5 of the diet-deficit subregions, increased area will account for about three-fourths or more of the projected increase in production.

In the United States, Europe, Japan, and Other East Asia, increases in grain production will come predominately from increased technology and nontraditional inputs. In all of these regions except Eastern Europe, the area planted to grains is expected to decrease. The projected decline in the area sown to grain in Northern and Southern Europe relates primarily to the reorganization of the production unit, which is now underway and is expected to continue. In Brazil, Other South Asia, and Africa except Southern Africa, increased grain production will largely be accomplished through increased area. Further increases in area are expected in India, West Asia, Oceania, the USSR, Mexico, and Canada. However, in these subregions, increases in yields will be more important in increasing production in the decade of the 1960's than in the past.

Population density and production intensity: The graphic function in figure 9 very closely fits the relationship between the man-land ratio and food production per acre of agricultural land for the subregions. And the free-hand function line separates the diet-adequate and the diet-deficit subregions. Increasing food production is first generally accomplished through increasing the area under crops and then through increasing yields per acre. After a land-man ratio of about

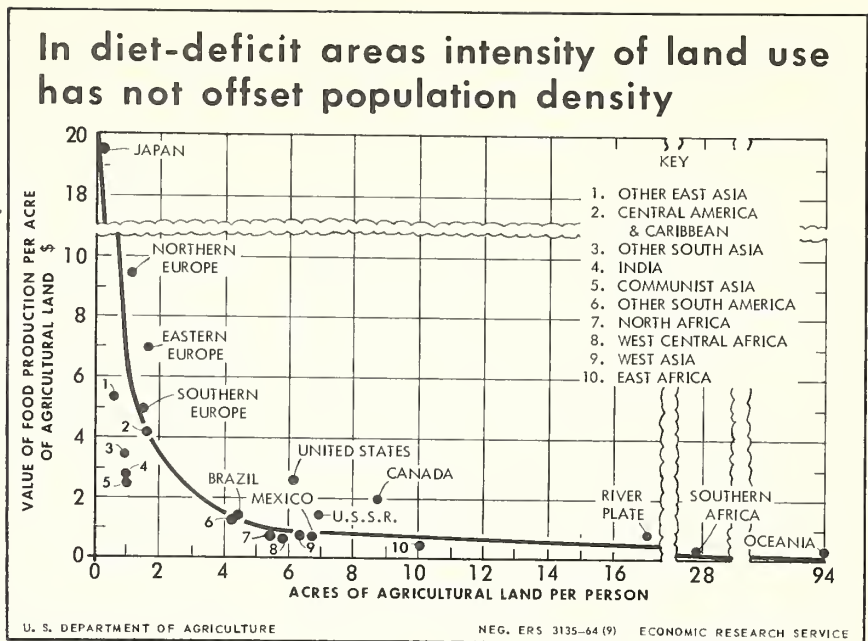


FIGURE 9

2 acres per person is reached, the pressure to increase yields is greatly intensified. Areas with the capital resources and the agricultural technology required to increase yields have been able to provide an adequate diet for their people.

The United States and Canada deviate from the function line. Although government policies of recent years have contributed, they were not the primary factors. Both countries achieved a high level of economic development without the necessity of maximizing total food output. It is unlikely that the United States has approximated its hypothetical position on the function line since the Midwest was settled. However, the United States was probably much closer at the turn of the century and appears to have begun an upward shift about the time that the agricultural population began to decline.

Can Production Keep Pace with Requirements?

The age-old question Malthus posed and answered negatively at the end of the 18th century is still germane for a large part of

the world: Will food supply keep pace with population growth? Malthus, to be sure, could not visualize the benefits to Western Europe of the virgin lands of the New World and of the new technology.

Since new lands generally are no longer available for solving mankind's food problems, the real problem facing the world today, apart from continuous population growth, is the gap separating the existing body of known technology from its application. It is in essence a productivity problem. The fact that such productivity has materialized as yet in only a small part of the world does not indicate that it cannot take place in other parts of the world. Nor should it require the same period of time. This is the main reason for optimism. But considerable gains through increased agricultural productivity may be nullified by growth of population.

Today's concern over raising worldwide agricultural production is in sharp contrast to attitudes prior to World War II. The 1930's were years of a serious world economic depression. Conditions were especially difficult for agriculture, since the decade before had also been a lean one in many countries. In most of the developed countries economic depression replaced continuous economic progress. In the underdeveloped countries, few if any deliberate and meaningful efforts were exerted toward increasing general agricultural production. Where a direct concern for agriculture in the underdeveloped countries was shown, it tended to concentrate upon problems of oversupply and low prices for raw materials. The great mass of people in the underdeveloped world had subsisted for centuries at the margin; this was more or less a fact of life. The developed countries were too busy with their own economic problems to pay much attention to others.

World War II stands out as a major line of demarcation between two eras. Its immediate impact was a serious disruption of agricultural production and trade patterns in most European

countries, including the Soviet Union. It served, however, as did World War I, as a major stimulant to agricultural production in the United States and other agricultural suppliers who escaped war damage within their countries.

The long-run impact of World War II differed markedly from that of its predecessor, however. Dynamic economic growth has typified most of the developed world. Much of Eastern Europe and the Soviet Union made rapid industrial growth. They also made major transformations in the structure and organization of agricultural production towards forced collectivization. Their postwar agricultural development has been uneven or slow and marked by retrogression because of the adverse effect of Communist policies, aggravated often by unfavorable weather. In the developed Western countries, agriculture has shown not only dynamic recovery but also substantial power for continued increases in production and productivity.

The most striking effect of these events for the underdeveloped world is summed up in the currency which the phrase "underdeveloped countries" has gained. The existence of underdeveloped countries is today recognized as a major problem. Not only are the developed countries seeking to help them; they are also encouraging them to help themselves. Bold schemes have been suggested and many undertaken. However, the immediate results of these programs in agriculture have not been particularly striking, although a great deal of attention has been directed to this sector.

There is much justification for seeing the postwar period as a beginning of a new era. The outlook for this new era is obviously obscured by many unknowns. Still, by 1970, some improvement in agricultural production in the less developed countries is expected, but it is doubtful that great and striking progress will materialize. The race is not so much one between population and the food supply but a race between what could be done and what will be done.

Expanding Trade in Food

The approach to world food trade in this study is to some extent a departure from conventional methods used in other studies of world agricultural trade and warrants the following explanatory comments and introduction. Quantity data for 1959-61 were taken from food balances for 92 countries; quantities for other countries in each subregion were estimated either by using published data on the foreign trade of such countries or by assuming that trade per capita was the same as in the food-balance countries. Because the food balances did not contain statistics for commodities, such as coffee and tea, which are generally considered food but which yield no calories, such commodities are excluded from the analysis of trade by subregions. The food balances generally also omitted statistics for oilseeds which were not used directly for food in a given country. Hence the trade in such oilseeds is omitted, although the trade in oils is included in the category of fats and oils. Where soybeans or peanuts were consumed directly as food, they were shown on the food balances and their trade is included in the category of pulses and nuts. This approach to the trade of each subregion results in world totals for exports and imports which show a larger imbalance than can be accounted for by the normal discrepancies of international statistics.

The projections of exports and imports for 1970 depend upon other projections. For each country projected exports represent the excess of projected production over projected domestic requirements for food and nonfood uses. Similarly, projected imports depend upon projections for production and domestic requirements. Thus, the disparity between world exports and world imports for 1970 results in part from aggregating projections of production and consumption which assumed that buyers for exports would be available and no accumulation of stocks would occur. To some extent the projected disparity in world trade can be offset by changes in stocks, but the

larger influence in reconciling the exports and imports in 1970 will be the failure of production and utilization to develop as projected.

Pattern of World Food Trade

Computations of the value of exports and imports in 1959-61 and 1970 were made by applying essentially the same prices to trade as to production and consumption. Although these computed values are useful in the analyses in this chapter, they cannot be compared with the reported value of trade in food for the United States or any other country. The computed value of world food exports averaged \$15.8 billion a year in 1959-61 which was roughly one-half of total world agricultural exports.

World trade in food commodities is predominantly in the diet-adequate area, which in 1959-61 accounted for 73 percent of total exports and 80 percent of total imports. The United States and Northern Europe exported 38 percent and imported 56 percent of the world totals. This situation is due largely to high levels of economic development, which afford the means to produce exportable supplies of goods to pay for imports of foods either to supplement or complement production. The diet-deficit area in 1959-61 was a net exporter of food commodities, whereas the diet-adequate area was a net importer. This apparent paradox is explained by the nature of the deficit area's exports. Except for a few countries which have a large export surplus in petroleum or minerals, the countries of the deficit area depend on exports of agricultural commodities--nonfood as well as food--for the bulk of their export earnings. Some of them must export food even when their supplies are inadequate. Although the deficit area is a net food exporter, its position has weakened considerably since World War II. (28) The trade position of several countries, in fact, has reversed to net imports; India is the most notable example. This generally reflects the area's inability to keep production in pace with domestic demand.

Table 24.--Computed value of world food trade, gross, net and per capita by subregion, average 1959-61 and projected 1970 1/

Subregion	Gross trade				Net trade				Per capita			
	Exports		Imports		Exports		Imports		Gross exports		Gross imports	
	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970
Diet-adequate	----- Million dollars -----											
United States.....	2,604	4,076	1,719	1,995	885	2,081	..	..	14.5	19.6	9.6	9.6
Canada.....	842	939	269	348	573	591	..	..	47.0	41.0	15.0	15.2
Mexico.....	105	209	28	42	77	167	..	..	3.0	4.4	0.8	0.9
Brazil.....	294	341	143	220	111	121	..	..	3.6	3.6	2.0	2.3
River Plate.....	678	1,000	39	34	639	966	..	..	29.8	37.0	1.7	1.3
Northern Europe.....	3,350	3,968	7,135	8,164	..	..	3,785	4,196	15.9	17.5	33.8	36.1
Southern Europe.....	745	1,126	970	1,331	..	..	225	205	7.7	10.8	10.0	12.8
Eastern Europe.....	661	852	1,000	1,026	..	..	339	174	5.7	6.7	8.6	8.1
USSR.....	657	922	444	455	213	467	..	..	3.1	3.8	2.1	1.9
Japan.....	157	317	676	1,355	..	..	519	1,038	1.7	3.1	7.3	13.3
Oceania.....	1,252	1,833	75	88	1,177	1,745	..	..	98.6	118.0	5.9	5.7
Southern Africa.....	175	389	49	70	126	319	..	..	9.9	17.7	2.8	3.2
Total.....	11,480	15,972	12,547	15,128	3,801	6,457	4,868	5,613	10.5	12.8	11.5	12.2
Diet-deficit	----- Million dollars -----											
Central America and Caribbean.....	1,012	1,055	233	291	779	764	..	..	31.3	25.1	7.2	6.9
Other South America.....	288	418	284	369	4	49	..	..	5.6	6.2	5.5	5.4
North Africa.....	239	257	409	647	..	..	170	390	2.8	2.4	4.8	6.1
West Central Africa.....	896	1,218	186	303	710	915	..	..	8.2	9.1	1.7	2.3
East Africa.....	141	261	98	124	43	137	..	..	2.9	4.3	2.0	2.0
West Asia.....	259	307	414	582	..	..	155	275	3.3	3.0	5.2	5.8
India.....	54	136	343	497	..	..	289	361	0.1	0.3	0.8	0.9
Other South Asia.....	59	94	249	485	..	..	190	391	0.5	0.6	2.0	3.0
Other East Asia.....	980	1,293	767	947	213	346	..	..	4.0	4.1	3.1	3.0
Communist Asia.....	390	605	202	368	188	237	..	..	0.5	0.7	0.3	0.4
Total.....	4,318	5,644	3,185	4,613	1,937	2,448	804	1,417	2.2	2.4	1.7	1.9
World.....	15,798	21,616	15,732	19,741	5,738	8,905	5,672	7,030	5.2	6.0	5.2	5.5

1/ See Appendix for unit value weights.

The volume of world food exports in 1970 is projected to increase 37 percent over the 1959-61 level, nearly double the rate of increase in world population. Projections indicate that: (a) The diet-adequate area will continue to dominate trade with its large basket of foods, but the area's position will shift from net imports to net exports; (b) the U.S. share of world food exports will increase from 16.5 percent to 18.8 percent, while Northern Europe's share will drop; (c) Japan's share of world imports will increase considerably; (d) Northern Europe's share of world imports will drop; (e) food exports of the diet-deficit area will increase 31 percent, but food imports will increase 45 percent.

The value of per capita gross imports and exports provides an even more striking view of the differences in food trade between the diet-adequate and the diet-deficit areas. In 1959-61, per capita exports averaged \$11 in the adequate area but only \$2 in the deficit area. Exports of 5 leading adequate subregions ranged from \$14 in the United States to \$99 in Oceania. The only deficit subregion approaching these magnitudes was Central America and Caribbean with \$31; but one product, sugar, accounted for most of this.

Per capita imports in 1959-61 averaged \$12 in the adequate area and only \$1.66 in the deficit area. The most outstanding adequate subregion was Northern Europe, with per capita imports of \$34. On the other hand, per capita imports of the deficit subregions were closely grouped in a narrow range from nearly zero in Communist Asia to \$7 in Central America and Caribbean.

Diet-adequate areas account for most food trade

VALUE OF WORLD FOOD TRADE

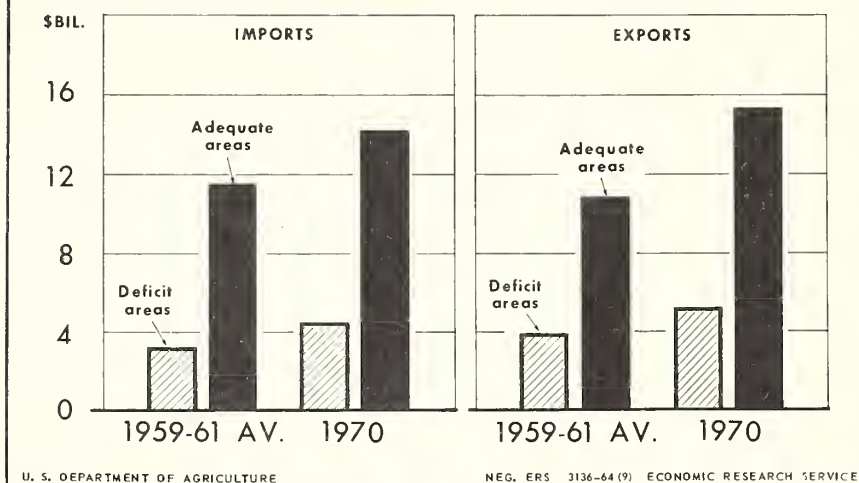


FIGURE 10

For the diet-adequate area, the trade projection trends reflect a greater degree of sufficiency in food production, but for the diet-deficit area a greater reliance on food imports to maintain or increase domestic consumption.

Projection of Food Trade

Wheat: Wheat is by far the world's most widely traded food commodity and has become increasingly important since World War II. (2) In 1959-61, average annual exports were 41 million tons, 139 percent above the 1934-38 average, and represent 19 percent of world production. The principal suppliers were the United States, Canada, USSR, Oceania, Northern Europe (a net importer), and the River Plate. Wheat imports of 15.6 million tons by the diet-deficit area were one-fourth of that area's supply available for food. Although the diet-deficit area's share of world imports has become larger during the past two decades, the largest importing subregions--Northern Europe and Eastern Europe--were in the diet-adequate area and accounted for 41 percent of total wheat imports in 1959-61. (See Appendix tables 36 and 37 for gross trade).

Projected world wheat trade for 1970 follows generally the trends of the past two decades. Wheat imports of the diet-deficit area will continue to increase, reaching 53 percent above 1959-61, and will account for a larger share (50 percent) of world trade. While imports are projected to rise faster than population growth in all deficit subregions except Central America and Caribbean and West Asia ^{10/}, the most notable increase is 137 percent in Communist Asia (3.2 million tons) ^{11/}. On the other hand, there was no

significant change projected for total imports of the diet-adequate area, the level remaining near 24 million tons. While significant import increases are projected for Brazil, Southern Africa, and Japan, these are offset by decreases for Northern and Southern Europe.

^{10/} The projected increase of only 29 percent for Central America and Caribbean results from sizable drop in the imports of Cuba.

^{11/} Imports by Communist Asia would still be less than the level of imports for 1960-63.

Table 25.--Distribution of computed value of world food trade by subregion, average 1959-61 and projected 1970

Subregion	Exports		Imports	
	1959-61	1970	1959-61	1970
<u>Percent</u>				
<u>Diet-adequate</u>				
United States.....	16.5	18.8	10.9	10.1
Canada.....	5.3	4.3	1.7	1.8
Mexico.....	0.7	1.0	0.2	0.2
Brazil.....	1.6	1.6	0.9	1.1
River Plate.....	4.3	4.6	0.2	0.2
Northern Europe.....	21.2	18.4	45.4	41.4
Southern Europe.....	4.7	5.2	6.2	6.7
Eastern Europe.....	4.2	3.9	6.4	5.2
USSR.....	4.2	4.3	2.8	2.3
Japan.....	1.0	1.5	4.3	6.9
Oceania.....	7.9	8.5	0.5	0.4
Southern Africa.....	1.1	1.8	0.3	0.3
Total.....	72.7	73.9	79.8	76.6
<u>Diet-deficit</u>				
Central America and Caribbean.....	6.4	4.9	1.5	1.5
Other South America.....	1.8	1.9	1.8	1.9
North Africa.....	1.5	1.2	2.6	3.3
West Central Africa.....	5.7	5.6	1.2	1.5
East Africa.....	0.9	1.2	0.6	0.6
West Asia.....	1.6	1.4	2.6	2.9
India.....	0.3	0.6	2.2	2.5
Other South Asia.....	0.4	0.5	1.6	2.5
Other East Asia.....	6.2	6.0	4.8	4.8
Communist Asia.....	2.5	2.8	1.3	1.9
Total.....	27.3	26.1	20.2	23.4
World.....	100.0	100.0	100.0	100.0

Table 26.--Net trade in food commodities by subregion, average 1959-61 and projected 1970 1/

Subregion	Wheat		Rice		Other grains		Other starchy crops		Pulses and nuts	
	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970
1,000 metric tons										
<u>Diet-adequate</u>										
United States.....	-16,012	-21,664	-1,554	-2,147	-10,536	-19,141	-149	-214	-113	100
Canada.....	-8,970	-10,000	51	57	-716	-226	7	-172	54	41
Mexico.....	4	-328	3	-63	-111	-192	-14	-21	6	-5
Brazil.....	1,911	2,824	-79	-94	26	97	-404	-545	-211	-236
River Plate.....	-1,947	-2,900	-24	-30	-3,145	-4,554	245	306	-3	-23
Northern Europe.....	7,748	6,679	645	693	12,839	15,249	-415	-1,137	876	967
Southern Europe.....	1,725	1,858	-308	-169	2,932	4,215	10	-583	-210	-236
Eastern Europe.....	5,300	5,300	527	520	621	1,400	-555	-200	-47	-80
USSR.....	-5,285	-5,500	621	70	-1,549	-1,900	0	0	47	0
Japan.....	2,640	2,970	268	0	1,750	4,454	-28	-8	949	3,011
Oceania.....	-3,940	-6,638	-84	-132	-1,057	-1,218	-8	-2	5	21
Southern Africa.....	226	450	72	98	-929	-2,719	-1	-6	-47	-52
Total.....	-16,600	-26,949	138	-1,197	125	-4,535	-1,312	-2,582	1,306	3,308
<u>Diet-deficit</u>										
Central America and Caribbean.....	891	1,148	561	662	68	178	-1,523	-2,261	-5	1
Other South America.....	1,339	1,863	-40	-94	155	195	-1,412	-2,725	-53	-83
North Africa.....	2,328	3,371	-360	-476	-73	210	47	-13	-125	-164
West Central Africa.....	435	750	432	677	-71	84	-496	-609	-891	-1,095
East Africa.....	208	499	166	195	-54	-236	-47	-37	-75	-174
West Asia.....	1,903	2,324	496	544	384	-29	2	-37	-69	-69
India.....	3,614	5,000	727	803	122	516	0	-42	0	-10
South Asia.....	1,393	2,841	963	1,651	0	0	68	141	63	59
East Asia.....	1,608	2,249	-1,706	-2,231	-384	-752	-929	-796	-63	-90
Communist Asia.....	1,273	3,131	-1,328	-1,212	398	459	-11	-17	-133	-187
Total.....	14,992	23,176	-89	519	545	625	-4,301	-6,396	-1,351	-1,812
World total.....	-1,608	-3,773	49	-678	670	-3,910	-5,613	-8,978	-45	1,496
Subregion	Sugar		Vegetables and fruit		Fats and oils		Meat, fish and eggs		Milk products	
	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970
1,000 metric tons										
<u>Diet-adequate</u>										
United States.....	5,910	6,451	1,379	1,205	-1,502	-2,892	756	846	-96	-116
Canada.....	760	975	1,075	1,456	8	10	-395	-460	-324	-379
Mexico.....	-396	-800	-287	-413	12	2	-80	-163	109	300
Brazil.....	-727	-1,200	-37	-55	9	13	-26	-61	0	76
River Plate.....	-16	-149	-202	-1,464	-85	-73	-607	-810	-40	-78
Northern Europe.....	2,476	3,374	9,374	11,810	3,150	3,487	357	584	-929	-2,228
Southern Europe.....	332	611	-4,875	-6,649	457	471	469	815	912	417
Eastern Europe.....	-1,027	-1,400	-309	-700	265	160	3	-200	54	0
USSR.....	1,412	1,100	805	800	-71	-300	15	-100	-24	0
Japan.....	1,296	1,638	13	27	318	691	-288	-415	208	726
Oceania.....	-647	-1,429	-113	-411	-216	-226	-870	-1,282	-859	-1,186
Southern Africa.....	-305	-1,086	-465	-661	13	-18	-102	-131	3	-21
Total.....	9,068	8,085	6,358	4,945	2,358	1,325	-768	-1,377	-986	-2,489
<u>Diet-deficit</u>										
Central America and Caribbean.....	-8,334	-8,003	-159	-267	136	147	86	89	204	347
Other South America.....	-607	-949	42	123	120	146	-49	12	703	1,037
North Africa.....	834	1,170	-888	-1,012	94	171	-45	119	377	624
West Central Africa.....	271	513	34	54	-585	-784	-133	-225	108	247
East Africa.....	-670	-1,555	1	-18	35	48	-21	-31	108	118
West Asia.....	810	1,006	-908	-969	137	282	8	110	145	249
India.....	-119	-896	0	-173	3	106	-14	51	186	231
South Asia.....	235	380	81	190	-42	-47	-36	-14	150	453
East Asia.....	-1,599	-1,831	-198	-383	-774	-1,226	309	321	1,408	2,061
Communist Asia.....	651	883	-88	-125	-184	-302	-320	-649	0	0
Total.....	-8,528	-9,282	-2,083	-2,580	-1,060	-1,459	-215	-217	3,389	5,367
World total.....	540	-1,197	4,275	2,365	1,298	-134	-983	-1,594	2,403	2,878

1/ Plus indicates net imports; minus (-) indicates net exports. See Appendix tables 36 and 37 for gross trade. See Appendix for definition of food groups.

Rice (rough equivalent): Rice trade is confined largely to the diet-deficit area, particularly in the subregions of Asia. In 1959-61 this area accounted for three-fourths of the world trade. Unlike wheat, only a small part of world rice production moves into foreign trade. Imports also provide a small portion of the rice supply available for food.

While the volume of world trade in other major grains has made impressive gains over the past quarter century, trade in rice has declined. This trend is mainly due to the reduction of surpluses in Asian producing countries. This has led to a substitution of wheat for rice by the traditional rice importers. The pattern of rice trade has also changed considerably. During the prewar period, East Asia was the only net exporter of rice, but in the interim the United States has become a net exporter, expanding its shipments to 1.6 million tons in 1959-61. East Asia not only has the leading exporting countries but also the leading importing countries.

Projected world rice imports for 1970 are 7 percent above 1959-61, with imports increasing in the diet-deficit area but declining in the adequate area. The most notable changes in the volume and pattern of projected trade are: (a) A drop in imports of 89 percent by the USSR; (b) Japan's withdrawal as an importer; (c) sizable increases in imports by West Central Africa, West Asia, and other South Asia; (d) a slight decrease in imports but a moderate increase in exports of Other East Asia; (e) sizable increases in exports by the United States, Oceania, North Africa, and West Asia; and (f) a substantial drop in the exports of Southern Europe.

Other Grains: Grains other than wheat and rice include corn, barley, sorghum grain, millet, rye, and oats. They are used both as feed for livestock and food for human consumption. Corn, the major grain of this group, is used largely for livestock feed in the United

States, Canada, and USSR. In other regions, especially in Latin America and Africa, corn is principally a food grain.

Only a small portion of other grain production--6 percent in 1959-61--enters world trade and nearly all (excluding rye in Europe) is used for livestock feed. World trade of other grain is principally (over 90 percent) within the diet-adequate area, where livestock products account for a larger share of food consumption. The major markets for these grains were Northern Europe, Southern Europe, Eastern Europe, and Japan. The leading suppliers were the United States, Canada, the River Plate, Northern Europe (a net importer), Eastern Europe (a net importer), Oceania, and Other South America.

Projections for 1970 anticipate rapid growth in the volume of imports in other grains. Generally, this reflects the intention of importing subregions to expand domestic livestock industries. The projections also point out the following significant changes in the trade of other grains: (a) Substantial increases in the imports of the traditional markets of Europe and Japan; (b) a threefold and a fourfold increase in imports by West Central Africa and India; (c) substantial increases in the exports of the United States, Northern Europe (though still a very large net importer), and Southern Africa; (d) a drop of over 40 percent in Canadian exports; and (e) a rapid rise in the exports of the diet-deficit subregions of East Africa, West Asia, and Other East Asia.

Shifts in net grain trade^{12/}: The pattern of net grain trade in 1959-61 for the diet-

^{12/} For simplification, the subregions have been grouped in the following manner: North America includes the United States and Canada; Latin America includes Mexico, Central America and the Caribbean, Brazil, and Other South America (excludes River Plate); Western Europe includes Northern and Southern Europe; Africa excludes Southern Africa; and Asia excludes Japan.

deficit area bears little resemblance to that for 1934-38 (2). In the earlier period, 2 of the 3 deficit regions, Africa and Asia, were net grain exporters. By 1948-52, these two made the transition from a net surplus to net deficit position. This pattern is projected to continue for 1970 with net imports for the 3 regions increasing substantially. Thus, in only about 35 years the net grain trade position of the diet-deficit area has reversed from 2.8 million tons of exports to 27 million tons of imports.

North America experienced the greatest change between the prewar period and 1959-61, raising its net exports of grain by 32 million tons. By 1970, its net exports are expected to

reach 53 million tons. Oceania remains a surplus grain area. Net exports have increased 84 percent between 1934-38 and 1959-61. By 1970, net exports from this area are expected to reach 8 million tons, an increase of 189 percent over the prewar period. With a market created in Eastern Europe and expansion of its grain acreage, USSR increased its grain exports considerably over the prewar period, from less than 1.3 million tons in 1934-38, to more than 6 million tons in 1959-61. A further increase to over 7.3 million tons is projected for 1970.

Western Europe has maintained a relatively stable position as a net grain importer

Table 27.--Net world grain trade by regions, average 1934-38, 1948-52, 1959-61 and projected 1970 ^{1/}

Region	1934-38	1948-52	1959-61	1970
----- 1,000 metric tons -----				
<u>Diet-adequate</u>				
North America.....	-5,312	-23,385	-37,737	-53,121
River Plate.....	-10,772	-3,683	-5,116	-7,484
Western Europe.....	23,741	22,025	25,581	28,525
Eastern Europe.....	-3,370	n.a.	6,213	7,220
USSR.....	-1,296	n.a.	-6,223	-7,330
Southern Africa.....	-262	83	-631	-2,171
Japan.....	1,887	2,751	4,658	7,424
Oceania.....	-2,768	-3,446	-5,081	-7,988
Total.....	1,848	2/n.a.	-18,091	-34,925
<u>Diet-deficit</u>				
Latin America ^{3/}	1,692	2,842	4,728	6,196
Africa ^{4/}	-408	246	3,011	5,074
Asia ^{5/}	-4,074	3,144	9,463	15,294
Total.....	-2,790	6,232	17,202	26,564

^{1/} Plus indicates net imports; minus (-) indicates net exports.

^{2/} Not applicable because of lack of data for Eastern Europe and the USSR.

^{3/} Excludes the River Plate but includes Mexico and Brazil.

^{4/} Excludes Southern Africa.

^{5/} Excludes Japan.

since prewar. Projections for 1970 follow this trend, with net grain imports 12 percent above 1959-61. Japan has been a rapidly expanding market for imports; 1970 projections are nearly four times the prewar level and 60 percent above the 1959-61 level.

Asia's net exports in the prewar period totaled 4 million tons, but by 1948-52 the region had shifted to a net import position. Net imports in 1959-61 were more than triple those in 1948-52, and a further increase of 62 percent is expected by 1970. In the prewar period, Latin America was a net importer and imports have continued to increase. By 1970 the net imports are projected to increase 31 percent over 1959-61.

Africa was a net surplus region in the prewar period, but this position was reversed in the following two decades. In 1959-61, net imports reached 2.4 million tons and are expected to be 2.9 million tons by 1970.

The 1970 projections for grains show exportable supplies exceeding import demand by around 8 million metric tons. This results from several factors: (a) Record exports in 1963-64, which some exporters now feel should be the normal situation; (b) projected recovery of production in some countries which were large importers of wheat in 1963-64, especially the USSR and Mainland China; (c) no increase in stocks projected in most of the countries, even though level of stocks should at least keep pace with level of consumption; and (d) assumption of "normal" weather in all countries at the same time. If all assumptions are met and production and utilization are as projected, substantial accumulation of stocks will result.

Other starchy crops: World trade in other starchy crops includes potatoes, sweet-potatoes, cassava (manioc), bananas and plantains. ^{13/} Trade is limited by the perishability of these crops. Only about 2 percent of the world's production, mainly potatoes and bananas, enters international trade; imports

represent only about 1 percent of the supply available for food. Some trade is diverted to nonfood products such as alcohol and starch.

Exports of other starchy crops are fairly evenly divided between the diet-deficit and diet-adequate areas. Since most of the diet-deficit subregions are tropical or semitropical, nearly all of their exports are bananas. Since many of the adequate subregions are in the temperate zone, the greater part of their exports is potatoes. The 1970 projections for total exports are up 31 percent from the 1959-61 average, with much of this gain resulting from increased shipments from the banana exporters, particularly Central America and the Caribbean, Other South America, and West Central Africa. Potato exports are not anticipated to rise nearly as fast. The principal supplier, Northern Europe, will likely have an increase of only 9 percent in the decade.

Imports, mostly potatoes and to a large extent seed potatoes, are confined mainly to the diet-adequate area, with Northern Europe the major market.

Pulses and nuts: On a tonnage basis, pulses and nuts are the least important food group in world trade. At least 30 percent of the trade includes cocoa beans and soybeans. Both the diet-deficit and diet-adequate areas export large volumes of pulses, but the flow of trade is generally centered in the adequate area, particularly in Northern Europe and Japan. Substantial shipments from the deficit area are in cocoa beans and nuts indigenous to the tropical climates.

Trade projections to 1970 for pulses and nuts portend a sizable increase over the 1959-61 level. But much of the gain can be accounted for by a tripling of soybean imports by Japan, a part of which will not be consumed directly as food.

^{13/} Bananas are included in exports but excluded in imports. (See notes on commodities in the Appendix.)

Grain shipments to deficit areas expanding

NET WORLD GRAIN TRADE

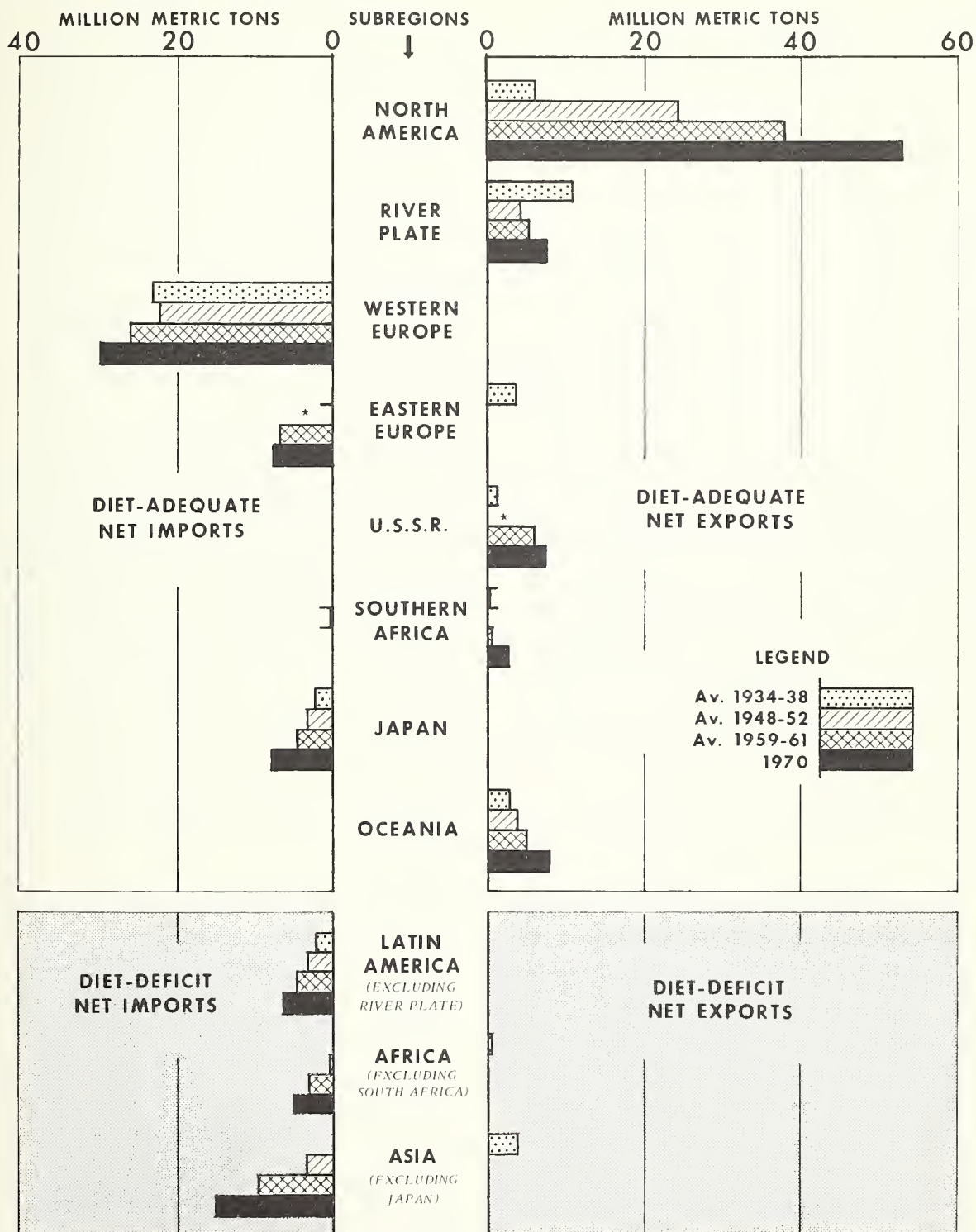


FIGURE 11

Sugar (raw): International trade historically has been important in the supply and demand situation for sugar. In 1959-61, total imports of 19 million tons were 33 percent of the world supply available for food. Traditionally, the direction of trade has been from the tropical cane sugar producers to the north temperate zone, or generally from the diet-deficit area to the diet-adequate area. In 1959-61, about two-thirds of world exports originated in the deficit area, with Central America and the Caribbean accounting for 67 percent of that amount. Other major exporting subregions are Other East Asia, East Africa, and Other South America, while large quantities of beet sugar enter intra-European trade. In 1959-61, the United States and Northern Europe imported over half the world total.

Since the suspension of trade between the United States and Cuba, the pattern of world shipments has shifted. Where the USSR was once a net exporter, it has become an importer and the principal market for Cuba's sugar exports. If imports from Cuba differ from the 1970 projected level, sugar production in the USSR probably will be adjusted accordingly. Communist China, formerly a very small net importer, began importing significant quantities from Cuba.

Projections for 1970 point toward a possible imbalance between exportable supplies and import demand. This situation arises from several forces: (a) Shifting of the former U.S. import quota for Cuba has encouraged overexpansion of production in the recipient countries, particularly in Latin America, which are anxiously seeking new avenues for increasing foreign exchange earnings; (b) domestic sugar production in the traditional importing countries has been accounting for an increasing share of the total supply for consumption; (With the removal of acreage restrictions in 1963, production in continental United States increased 17 percent.); and (c) the rate of increase in per capita consumption of the higher income countries has

diminished; U.S. per capita consumption may drop slightly. (1)

Thus, export availabilities in 1970 are projected to increase about 25 percent over the 1959-61 level and imports are projected to increase only 15 percent. Projections indicate: (a) Imports of the two primary markets, the United States and Northern Europe, will increase 9 percent and 10 percent, respectively; (b) exports from Central America and the Caribbean, the world's major shipper, will drop slightly because of reduced supplies in Cuba; (c) exports from River Plate, Oceania, Southern Africa, East Africa, and India will more than double; and (d) exports from Brazil and Other South America will increase substantially.

Vegetables and fruits: World trade in vegetables and fruits is concentrated within the diet-adequate area, where imports of 17.2 million tons (including bananas) in 1959-61 represented 95 percent of the world total and exports of 10.8 million tons accounted for 78 percent. Major shipping subregions were Southern Europe, the United States, Northern Europe, West Asia, Eastern Europe, and North Africa. Major markets were Northern Europe and the United States (net importers), accounting for 60 and 16 percent of the total, respectively. The volume of exports in 1970 is projected to increase 51 percent over 1959-61.

Fats and oils: World trade in fats and oils has changed markedly during the past two decades. Much of this change can be attributed to the rapid growth of soybean production in the United States and concurrently the prominence of soybeans and soybean oil in U.S. agricultural exports. (28) During the prewar period, the flow of trade was generally from the diet-deficit area to the diet-adequate area. However, in 1959-61 the diet-adequate subregions accounted for 68 percent of world exports and 87 percent of world imports. The major exporting subregions included the United States, Northern Europe (re-exports), Other

East Asia, and West Central Africa. The main importers were Northern Europe, Southern Europe, and Japan.

World exports in 1970 are projected to be 50 percent above the 1959-61 level. Nearly half of this gain is accounted for in the projected increase of U.S. exports. Projections indicate that Northern Europe will continue to be the predominant market, accounting for over half of total imports. Japan is expected to more than double imports during the 1960's.

Meat, fish, and eggs: The world supply of meat, fish, and eggs is largely produced and consumed in the diet-adequate area. International trade, accounting for only 7 percent of production in 1959-61, has a relatively minor role in supply distribution. The movement of world trade is predominately among the subregions of the adequate area, which accounted for more than 85 percent of both total exports and imports in 1959-61. Northern Europe, a net importer, dominates world trade, accounting for 40 and 51 percent of total exports and imports, respectively. Other major markets include the United States, Southern Europe, and Eastern Europe.

The volume of trade in 1970 is projected to rise about 40 percent from the 1959-61 level and to continue to be mostly within the diet-adequate area. While shipments are expected to be supplied by the traditional exporters, the most notable projected gains are 47 percent for Oceania, an increase that would make this subregion the second ranking exporter. In Japan and Southern Europe--where changes in customs coupled with rising incomes have led to a rapidly expanding demand for meat--projected imports are five times the 1959-61 level for Japan and double that level for Southern Europe.

Milk products 14/: Dairy farming is prevalent in the cooler and relatively humid regions of the temperate zones. About 80 percent of the world's milk is produced in North America, Europe, the USSR, Oceania, and

South Africa. (28) Because milk is mostly consumed where it is produced, only around 3 percent of total world output crosses national boundaries and is generally in the form of cheese, evaporated and condensed milk, dry milk, and other processed products.

The diet-adequate area supplied nearly all exports of milk products in 1959-61. About 71 percent came from Northern Europe (a net importer) where the Netherlands, Denmark, and France were the major suppliers. The United States supplied 6 percent of total exports.

International trade in dairy products is likely to be influenced by the emergence of large exportable surpluses in the diet-adequate area. Projections indicate that milk production by 1970 in the diet-adequate area will increase by about 22 percent but consumption by 18 percent over the 1959-61 level. Exportable supplies will likely rise to 7.4 million tons, with a decline of 6 percent in imports. Northern Europe will continue to be the largest market, with other major markets in Southern Europe and Japan.

An increase of 59 percent in imports by the deficit area is projected for 1970. Much of this gain is expected to be shipped as food aid. The greatest gains are expected for South Asia, West Asia, West Central Africa, and Central America and Caribbean.

Problems in Expanding Food Trade

For various reasons, governments have adopted foreign trade policies detrimental to world agricultural trade. Most often, policies have been used to protect domestic industries, to raise revenue, to regulate the flow of scarce foreign exchange, or to enhance national security. (28) Traditionally, the tariff system has been the device through which such policies

14/ Data for trade in milk products are given in terms of whole milk equivalent and exclude butter. Skim milk products are excluded from exports but included in imports. (See notes on commodities in the Appendix.)

have been implemented. But in recent years, nontariff controls have been widely used to curb the volume of imports. These include import quotas and embargoes, variable levies and gate prices, conditional imports, advance deposit requirements on imports, import discrimination and preferential treatment, and import licensing. (35)

Many of the developing countries have been beset by serious balance-of-payments deficits. These have partly resulted from a decline in prices of agricultural exports, which account for about 70 percent of total foreign exchange earnings of the developing countries, and an increase in the prices and volume of imports of capital goods needed for development. The long-term trend of gold and foreign exchange reserves of many developing countries is down. Most evident losses are in Brazil, the River Plate, Egypt, and India, where reserves during the decade 1953-62 have fallen at an average annual rate of \$12.0 million, \$17.0 million, \$66.1 million, and \$174.5 million, respectively. (23) Thus, many of the areas that would need to import foods to bring the diet up to an adequate standard can least afford to pay for such imports under normal commercial terms. Also, there is a tendency to conserve scarce exchange for import of capital goods and equipment needed for economic development and to rely heavily on domestic production to furnish the national food supply.

When discussing deterrents to trade expansion, it is also necessary to cite the physical facilities of the distribution system--transportation, storage, and the other marketing structures. Transportation facilities are a primary requisite to the movement of goods in international trade. Inadequate port and storage facilities negate the advantages of low-cost handling via waterways. Landlocked countries with poorly developed transportation systems are necessarily excluded from the comparative advantages of international trade. The inadequate marketing facilities that exist in many of the diet-deficit countries impede food

trade by the lack of necessary wholesaling and retailing functions for the consumers. A country lacking refrigeration facilities would necessarily be limited in what it could import or export by the perishability of the food product.

Basic to this discussion is the availability of income or the means to pay for food imports. There is nothing more deterrent to trade than the lack of purchasing power. Per capita incomes in the adequate area are relatively high; those in the deficit area are low. The vast quantities of foods imported supplement the domestic supplies of the diet-adequate area. Were it not for the ability to pay for those imports, several countries in the adequate area would have deficit diets.

Can the role of food trade, so vital to consumption in the major importing countries of the adequate area, be paralleled in the diet-deficit area? Can the nutritional gap of the diet-deficit area be bridged by food imports? There has been much conjecture over these salient questions. But the consumption projections of this study indicate that replies to both questions are negative, though qualified. They are qualified because food imports now constitute a significant portion of the food supply of several deficit subregions, particularly North Africa, Central America and Caribbean, and West Asia. Without imports, the deficit would be much larger. Also, the 43 percent increase in food imports of the diet-deficit area, though not filling the gap, was partly responsible for the projected improvement in the deficit area.

A comparison of the value of food imports to food consumption affords an indication of the relative importance of imports for food supplies and provides a reasonable guide to the degree that imports can be depended upon for food supplies. Using the 1970 projections, the ratio of gross food imports to consumption was 15 percent for the diet-adequate area but only 6 percent for the diet-deficit area. This again reflects the higher purchasing power of

the adequate area. Gross food imports of Northern Europe were 36 percent of food consumption; those of Japan were 21 percent and those of Canada were 14 percent. In the deficit area, the largest ratio of food imports to consumption was 16 percent, in North Africa. Thus, given the means to purchase foods, the subregions of the diet-deficit area could move

much further in importing food than their projected positions. For this to occur, certain changes would be necessary in the variables which formed the basic assumptions underlying the trade projections--namely, per capita income and the availability of food imports sold on concessional terms by the major food exporters.

Table 28.--Computed value of food consumption, gross food imports and their ratio, by subregion, projected 1970

Subregion	Food consumption	Gross food imports	Imports/consumption
	<u>Million dollars</u>	<u>Million dollars</u>	<u>Percent</u>
<u>Diet-adequate</u>			
United States.....	23,412	1,995	8.5
Canada.....	2,411	348	14.4
Mexico.....	2,138	42	2.0
Brazil.....	5,721	220	3.8
River Plate.....	2,658	34	1.3
Northern Europe.....	22,679	8,164	36.0
Southern Europe.....	8,217	1,331	16.2
Eastern Europe.....	8,917	1,026	11.5
USSR.....	18,178	455	2.5
Southern Africa.....	1,345	70	5.2
Japan.....	6,390	1,355	21.2
Oceania.....	1,846	88	4.8
Total or average.....	103,912	15,128	14.6
<u>Diet-deficit</u>			
Central America and Caribbean.....	2,046	291	14.2
Other South America.....	3,750	369	9.8
North Africa.....	4,065	647	15.9
West Central Africa.....	4,465	303	6.8
East Africa.....	2,643	124	4.7
West Asia.....	4,454	582	13.1
India.....	17,200	497	2.9
Other South Asia.....	5,821	485	8.3
Other East Asia.....	11,662	947	8.1
Communist Asia.....	25,640	368	1.4
Total or average.....	81,746	4,613	5.6
World.....	185,658	19,741	10.6

What Must be Done

The Task of Deficit Countries

Two-thirds of the people of the world live in areas where there are shortages of food. The diet-deficit countries are poor and diet deficiencies merely reflect the low level of living in general. While something can be done to alleviate food deficits directly, the desirable solution is a rapid increase in productivity and income per capita.

Because of the rapid growth of population in the less developed countries--a condition which Coale and Hoover found to be a serious retarding influence on capital formation and investment (5)--and also because of the widening gap in income between the rich and poor countries, very special efforts must be made in economic and social development in general. Since the underdeveloped countries generally have 60 to 80 percent of the labor force engaged in agriculture, strenuous efforts toward agricultural development are called for. These efforts will face serious handicaps, since a major requisite is the raising of labor productivity in the agricultural labor force largely illiterate and lacking in capital and the technical and managerial skills necessary for adopting modern methods. Insufficient food, resulting in impaired health, inertia and low stamina, also contributes to low productivity of the labor force.

Some underdeveloped countries are so blessed with unexploited land resources that it is possible to expand the area cultivated faster than the population is growing. They can thus meet increased demands for agricultural products by tilling more land rather than by tilling the old land better. But most people in the diet-deficit area live in countries where expansion of the cultivated area has not kept pace with the accelerating population in the past decade or two. In such countries, successful agricultural development demands a simultaneous increase in land cultivated, in labor productivity, and in yields per acre--a formid-

able task made still more formidable by the necessity for providing capital not only for agriculture but also for a rapidly growing nonagricultural sector and urban population.

Food aid has made, and will continue to make, important contributions to the direct improvement of diets as well as to economic development. However, the potentialities of food aid in directly improving diets are limited. The cost of filling the food deficit in 1970 would amount to \$6.8 billion (\$2.5 billion, excluding Communist Asia). The level of concessional exports projected for 1970 under the U.S. Food for Peace Program is less than \$1.8 billion. This program currently accounts for over 90 percent of the total food aid extended by all countries and international agencies.

The problems of filling the food gap by expanding commercial imports also are very acute. Gross food imports--commercial and concessional--in 1970 are projected to be only \$4.6 billion for all the diet-deficit subregions. Export earnings of most developing countries depend heavily on only a few commodities frequently subject to problems of oversupply and low and sharply fluctuating prices, resulting in unstable export earnings from year to year. Many of these countries face persistent unfavorable balance-of-payments problems. With limited foreign exchange reserves and many high priority demands for imports, food is not generally given a high priority, except in emergencies. Therefore, considering on the one hand the size of the nutritional gap and on the other the limitations of expanded food aid and chronic balance-of-payments problems in most of the underdeveloped countries, the food gap will likely have to be filled largely within each country itself. This will be a formidable task.

Requirements for development: It is becoming more generally recognized that the great diversity of characteristics of the underdeveloped areas makes it impossible to apply a single formula for speeding development.

The resources, stage of development, and culture of each society must be considered in preparing plans and programs for economic progress. However, despite the diversity of circumstances, there appear to be several important requirements of social organization if rapid economic progress is to be made.

Perhaps the most crucial among these requirements is a reasonably stable and reliable government. While a stable government does not ensure economic progress, the forward-looking decisions necessary for progress cannot be made rationally without reasonable stability.

A requirement just as important is that those in a position to make important decisions affecting development programs attempt to see the development process as a whole and resist the temptation to seize on simple formulas, such as a concentration on heavy industry, to the neglect of more subtle but often more important aspects. This envisages an organization which will quickly and effectively transmit to persons who must make allocative decisions both the detailed information and the incentives to make efficient decisions. This requirement encompasses a very broad range of most difficult problems, including the issues of socialism versus capitalism, centralization versus decentralization, forms of tenure, size of farm, and organization of market.

Another essential for progress is the widespread distribution of a substantial part of the benefits of progress. Democratic governments must exhibit a genuine concern for social justice, both to maintain stability and to gain the enthusiastic support of the masses for development programs. Even totalitarian governments today must be concerned with some degree of equity in distribution of the fruits of progress. One of the reasons for a wide distribution of benefits is that the development of a modern industrial society requires that there be mass markets to stimulate efficient production.

Also essential for rapid economic growth is a high proportion of literacy. With literacy will come a greater receptivity to technical progress. This requirement is directly applicable to agriculture; it cannot be modernized rapidly with a largely illiterate peasantry. The cost of wide and rapid distribution of detailed knowledge about new techniques, market conditions, etc., is greatly reduced when the users are able to read.

Development of research specific to the needs of the underdeveloped country is essential. Science and technology must be adapted to the physical and cultural characteristics of each area if they are to make a maximum contribution. For example, hybrid seed corn must be developed for specific climatological characteristics. Most of the underutilized agricultural land is in subtropical and tropical zones. Some research has been done in these areas, but little success has been achieved in increasing the productivity of these soils. There appears to be no practical alternative to the development of good scientific and technological institutions within the underdeveloped areas to do the basic research necessary for adaptation to local conditions.

Industrial development must proceed with agricultural development. Without industry, a country cannot produce the fertilizer, pesticides, and machinery necessary to achieve improvement in yields.

It is necessary to remember, however, that the processes of economic and social development are costly to some vested interests. As a distinguished panel of economists reported to the United Nations: "There is a sense in which rapid economic progress is impossible without painful readjustments. Ancient philosophies have to be scrapped; old social institutions have to disintegrate; bonds of caste, creed, and race have to be burst; and large numbers of persons who cannot keep up with progress have to have their expectations of a comfortable life frustrated. Very few communities are willing

to pay the full price of rapid economic progress." (30)

The Task of Developed Countries

Increasing food aid: In some industrialized countries, food production has been increasing faster than commercial demand, and there are strong tendencies for this situation to continue. The contemplation of this abundance, which has at times been so great as to be embarrassing, has roused interest in the possibilities of the use of surpluses to alleviate the problems of the underdeveloped countries.

Many developing countries have come to depend to a large extent on aid in the form of agricultural commodities, which come largely from U.S. surplus stocks. Shipments of wheat under foreign aid programs, largely from the United States, have accounted for a very large share of wheat imports by many of the developing countries in recent years. In some countries, food is the major component of U.S. aid. For example, approximately 60 percent of U.S. aid to India during recent years has been in the form of food.

The use of food aid has aroused concern over the possible negative impact on commercial exports of food and domestic production of food in the receiving countries. However, with proper precautions, food aid in substantial amounts can provide much needed assistance to developing countries without seriously affecting existing commercial markets. Analyses of the impact of food aid on specific countries have concluded that such aid has stimulated economic growth and been a significant help to the receivers. These food supplies have frequently prevented prices from rising excessively, have enabled the receiving countries to conserve scarce foreign exchange for development purposes, and have at times prevented famine. In 1962, the FAO published "Development through Food" as one of a series of studies supporting the Freedom from Hunger Campaign. This study

concluded, "Food aid does and should play an important role in aid programs." (10)

A recent study of the impact of the U.S. P.L. 480 Title I program in Israel concludes that imports of surplus agricultural commodities, totaling \$152 million in 1955-60, allowed for additional investments of \$100 million, making possible a permanent increase of about 2 percent in the net national product in 1961. In addition, there was a rise in real consumption attributed to the program as well as an important effect on limiting inflation. (22)

Food aid contributes to the relief of emergencies, but the full benefit of food aid can be received only when it is used to encourage economic development and social reform--as when it is used to stimulate the attendance of children at school or the use of otherwise idle labor at such jobs as school construction and land reclamation. Use of food aid merely to hold down retail prices is likely to affect agricultural development adversely by postponing necessary changes in the marketing system or in the costs-and-returns situation of the farmers. One of the most admired aspects of the Food for Peace program is the extent to which it has already stimulated the formation of capital, human as well as material.

Economic and technical assistance: The purpose of economic assistance is to stimulate economic growth through a higher rate of capital investment than would be possible with only internal savings. Technical assistance enables developing countries to skip certain stages of economic growth experienced by the developed countries, thereby allowing them to progress more quickly than would otherwise be possible.

Foreign aid on a worldwide scale has risen rapidly since the end of World War II. In 1946-52, the United States was the principal source of foreign aid. During this period, the United States provided over \$34 billion for postwar relief and the financing of the

Marshall Plan for the reconstruction of Europe's economy. (31)

Most industrialized countries in recent years have also been providing funds for the economic development of many less developed countries. These development funds have come from both public and private sectors. During 1962, developed countries, excluding Sino-Soviet Bloc countries, extended about \$8.5 billion in economic assistance to the developing countries. This includes contributions to the multilateral aid agencies. Total assistance, including that by the Sino-Soviet countries, amounted to about \$9.0 billion. Nearly 80 countries and overseas territories with a population of about 1.5 billion received this assistance. (26)

The United States continues as a major source of funds for economic development, both through direct government-to-government aid and through the multilateral aid agencies. In 1962, the United States extended about \$4.8 billion in bilateral assistance. In addition, it provided over \$200 million to the multilateral agencies, about one-third of the total support of these organizations. (31)

Funds for economic and technical assistance, from all sources, probably will continue to increase during the remainder of this decade. However, it is not enough just to transfer funds from the rich to the poor. Assistance must be accompanied by proper planning, supervision, and coordination if the economies of the developing countries are to make maximum use of this assistance. If the developing countries are to speed up their rate of progress, economic and technical assistance will have to be expanded and used more efficiently. Especially, the developing countries need to do some long-range planning. Without such planning, economic and technical assistance frequently is not as effective as it should be. Countries of Latin America are now in a better position to do this job, since any extensive financial and technical assistance

under the Alliance for Progress must be in support of their overall development plans.

Expanding world trade: Secretary of Agriculture Freeman in his address to the World Food Congress in 1963 said: "I believe it is in order for us all to bear in mind the importance, to the overall achievement of our goal, of the expansion of world commercial trade. Many food-deficit nations depend on the expansion of world commercial trade. Many depend on the export of a single exportable food commodity, such as coffee, and to them international arrangements that would regularize and stabilize trade in that commodity are crucially important. To all nations, developed and developing alike, expanding world trade brings abundance closer to reality."

The principal trade problem common to developing nations is their large degree of dependence on exports of primary commodities, which for the most part do not have favorable prospects as earners of foreign exchange. In 1962, at the behest of the less developed countries--which wanted global consideration of their particular problems--the United Nations Economic and Social Council agreed to hold a world trade conference. The United Nations Conference on Trade and Development (UNCTAD) was held in Geneva in 1964. This Conference, attended by representatives from over 100 countries, explored trade problems facing the less developed countries. The agenda for UNCTAD centered around the needs of these countries for foreign exchange and the possibilities for securing it.

UNCTAD recommended that the U.N. General Assembly establish, at its November 1964 meeting, the U.N. Conference on Trade and Development as one of its permanent organs to deal with trade problems of developing nations as they affect economic development. The main function of this Conference would be to make international trade a better instrument for economic development by promoting the growth of trade between developed and

developing countries, between countries with different economic systems, and among the developing countries themselves. The Conference would be a forum for discussions of trade relations between governments, in the hope of making these relations more harmonious. The resolutions of the Conference would only be recommendations and not legally binding commitments.

One of the major recommendations adopted by UNCTAD suggested wider consideration of international commodity arrangements and called for a program to reduce tariffs and nontariff barriers to the exports of developing countries. A food-aid proposal was unanimously adopted and recommended that when the U.N. and its Food and Agriculture Organization review the work of the World Food Program, consideration be given to increasing the Program's cash component. Other UNCTAD recommendations dealt with ways to mitigate the impact of synthetics on the industries of developing countries, to expand commodity trade among these countries, and to promote their exports through better production and marketing systems. (38)

A far-reaching trade negotiating session that could have a profound impact on the agricultural and industrial trade of all countries is currently underway in Geneva. This session, known as the Kennedy Round of negotiations under the General Agreement on Tariffs and Trade (GATT), began in May 1964. It is aimed at increasing trade by lowering or removing trade barriers on both agricultural and industrial products. To be negotiated are fixed import duties, variable import levies, and non-tariff barriers to trade.

Since many of the less developed countries are members of GATT--they constitute two-thirds of its membership--they will benefit from the Kennedy Round. The industrialized GATT nations have agreed to include the products of less developed countries in the tariff-cutting sessions, without asking for full reciprocity.

Possibilities of Technological Breakthrough

In the immediate future: In making projections of the world food situation to 1970, consideration was given to population growth, income growth, agricultural production, and international trade, including trade in the form of aid. No consideration was given to the possible effects of widespread application of technologies now in the experimental or developmental stage. It is felt that the diet-deficit countries would be unlikely to benefit extensively from any new technologies which might emerge from the laboratories before 1970, principally because such new technologies will inevitably be developed in countries which are now relatively advanced technologically and, therefore, are in the diet-adequate category. Probably no precedent can be found for the exploitation of a technical breakthrough in a relatively low-income country before its exploitation in more advanced countries. Unfortunately for the underdeveloped countries, really new technology tends to widen the income gap between countries.

There exist, however, many opportunities for applications of technology that can benefit the countries which now fall in the diet-deficit class. In the developed regions is a vast reservoir of knowledge as well as an abundance of improved technology which, if properly adapted to the specific conditions of the deficit countries, could go a long way towards increasing the output of food. However, no matter how good this technology is, the problem of introducing it into the producing sector of another country is complicated by a number of factors.

This is not to imply that there is no possibility for significant improvement in diets even in the short run by wider application of knowledge of nutrition and food technology already available. For example, there are a number of new protein-rich food products being produced in limited quantities. These could be greatly expanded--they are especially valuable

for combating malnutrition among young children. These products are food mixtures based on groundnuts, cottonseed, soybeans, fish, and other foods. In Latin America, a high quality protein food product called Incaparina is now being produced entirely from products grown in the area. Similar mixtures are being developed for other areas.

The impact of improved technology upon food production in the industrialized countries is well known. Of all technological innovations, fertilizer stands out as the most important. In the United States, crop output per acre increased 43 percent between 1940-41 and 1955. Almost one-half of this increase is the result of increased use of fertilizers. (6) U.S. crop output per acre since 1955 has increased almost one-third, while fertilizer inputs have increased almost 50 percent. Williams and Couston have demonstrated successfully with both cross-sectional and time-series analysis that increases in yield throughout the world are closely related to the level of fertilizer use. (16)

In the overpopulated countries of Asia, Japan stands out as the only diet-adequate subregion. Japan's fertilizer use amounts to over 230 pounds of plant nutrients per acre of arable land. The other Asian subregions use very small amounts. Northern Europe, also with a high population density, has increased fertilizer use about 5 percent per year since 1955. USSR, which expanded tremendously its sown area during the past decade, largely on marginal land, has recently begun a plan to raise the low yields, principally through increased application of fertilizer.

In areas where yields must be increased, fertilizer certainly must contribute largely to any gains. However, in some key regions such as India, an irrigation-fertilizer combination will be more important in increasing yields than it has been in many industrialized countries because of less favorable climatic environment.

In some countries, the most significant aspect of the food problem may be the economic inability to process, store, and transport the products from producer to consumer rather than the inability to produce adequate amounts and varieties of food. The marketing problem in some countries is made more difficult by the fact that the major areas of production and consumption are far removed from each other. Developments now only in the beginning stages, such as preservation of food by radiation and dehydration, could conceivably have a major impact in such areas within a relatively short period.

In the more distant future: Other developments show promise of expanding food output for the future. In recent years, considerable progress has been made in the desalinization of water. Were it possible to desalinate water at reasonable cost, the oceans and seas could supply man's water needs for all time. But for the immediate future, the economic use of such water in agriculture does not appear likely, except in limited areas and for certain high value crops.

The production of foods from the oceans and inland waters also has a tremendous potential for increasing the supply of food. About 75 percent of the earth's surface is covered by water, from which only about 10 percent of the animal protein and not more than about 1 percent of total food supplies are now derived. Methods for increasing the output of fish include the fuller utilization of wet rice paddy fields and farm ponds. It has been estimated that in the Indo-Pacific area alone, there are about 37 million hectares of inland waters which could be used for fish culture. (12)

In the future, these sources could, in addition to supplying much greater quantities of fish and fish products, be a significant source of other foods, especially seaweed and plankton. Millions of tons of seaweed grow in various waters of the world; these resources

are virtually untouched. There are also tremendous quantities of zoo-plankton, currently being used to a limited extent in some Asian countries. Although at the present time the exploitation of such resources is not technically or economically feasible in many places, interest in overcoming the technical problems is increasing.

In recent years, a number of relatively untouched sources of food have been considered for expanding world food output. Yeasts and algae with high protein and vitamin content

can be used to convert wastes into food and produce large quantities of high quality protein. Proteins and vitamin concentrates can be obtained by microbial fermentation of petroleum. Vitamins and amino acids are now produced synthetically. The production of synthetic carbohydrates may eventually be technically and economically feasible. In the long run, the possibilities for increasing the output and the availability of food by such methods are great. However, these developments are unlikely to have much impact on the world food situation by 1970.

IMPLICATIONS FOR U.S. AGRICULTURE

Agricultural Trade

The United States plays the leading role in world agricultural trade. It is the leading exporter of farm products, supplying one-fifth of the total entering world trade, and is the second largest importer, taking about one-sixth of the world's agricultural imports. The U. S. role in expanded world agricultural trade will become increasingly important if reasonable access to foreign markets can be assured.

Export and Import Trends

U. S. farm products go to over 125 countries and territories. The U. S. share of world agricultural trade has often varied widely but has increased in recent years. In 1953-55, U. S. agricultural exports had an annual average value of about \$3 billion and accounted for 12 percent of the total world agricultural exports. By 1963, the value had gone up more than 86 percent, to \$5.6 billion, increasing the share to 18 percent. In fiscal year 1964, U. S. agricultural exports reached a record level of \$6.1 billion.

Grain and preparations, the leading export commodity group, account for about 40 percent of the total value of U. S. agricultural exports. In 1963, U. S. exports of wheat and flour accounted for about two-fifths of world trade of those commodities. Exports of U. S. coarse grains in the same year amounted to about half of the world market. Although the United States produces only 1 percent of the world's supply of rice, it is the third leading exporter of this food, accounting for about one-sixth of the total.

Oilseeds and oilseed products recently have become important export products of the United States. In 1963, U. S. exports of soybean and cottonseed oil, plus oil equivalent of exported seeds, represented about 92 percent of world exports of these products.

The United States is the leading exporter of poultry and lard. Fruits and vegetables, dairy products, and variety meats are also important U. S. export products.

Although the net agricultural trade balance of the United States is highly favorable, the United States is the world's second largest importer of agricultural commodities with a value of \$4.0 billion in 1963. Our country buys about half of the world's coffee and banana exports, about one-third of the cocoa beans, one-fifth of the sugar, and about one-sixth of the rubber exports. The United States is also an important market for meats, vegetable oils, dairy products, and fruits and vegetables. One-fourth of all our imports for consumption are agricultural products. Agricultural imports exceeded the value of farm products exported until 1956, when a \$300 million favorable balance was gained. Since 1960, the value of agricultural exports has exceeded the value of farm imports by almost \$1 billion.

U. S. imports of agricultural products from the diet-adequate subregions increased from \$1,982 million to \$2,086 million from 1952 to 1963, about 5 percent. But agricultural imports from the diet-deficit areas decreased by 24 percent. Imports from only 2 diet-deficit subregions increased--East Africa and West Asia. The share of U. S. imports supplied by diet-adequate subregions increased from 44 to 52 percent while the diet-deficit regions supplied a decreasing proportion, 56 to 48 percent.

Projection of U. S. Food Exports 15/

Within the concept of the World Food Budget, it is useful to examine the role of the United States in international export trade of food commodities and to project U. S.

^{15/} In this section, Brazil, although diet-adequate, is combined with Other South America; India is combined with Other South Asia.

Table 29.--United States agricultural exports by subregion, 1952 and 1963

Subregion	Value		Distribution	Change
	1952	1963	1963	1952 to 1963
	Million dollars	Million dollars	Percent	Percent
<u>Diet-adequate</u>				
Canada ^{1/}	259	597	10.7	130
Mexico.....	100	84	1.5	-16
Brazil.....	101	102	1.8	1
River Plate.....	21	4	0.1	-81
Northern Europe.....	1,179	1,643	29.4	39
Southern Europe.....	258	374	6.7	45
Eastern Europe.....	43	251	4.5	484
USSR.....	0	7	0.1	0
Southern Africa.....	20	24	0.4	20
Japan.....	428	651	11.7	52
Oceania.....	29	41	0.7	41
Total and average.....	2,438	3,778	67.6	55
<u>Diet-deficit</u>				
Central America and Caribbean.....	226	143	2.5	-37
Other South America.....	145	167	3.0	15
North Africa.....	53	240	4.3	353
West Central Africa.....	17	77	1.4	353
East Africa.....	3	7	0.1	133
West Asia.....	49	207	3.7	322
India.....	258	361	6.5	40
Other South Asia.....	28	177	3.2	532
Other East Asia.....	214	428	7.7	100
Communist Asia.....	0	0	0	0
Total and average.....	993	1,807	32.4	82
Total all subregions.....	3,431	5,585	100.0	63

^{1/} Includes transshipments.

Table 30.--United States agricultural imports by subregion, 1952 and 1963

Subregion	Value		Distribution 1963	Change 1952 to 1963
	1952 Million dollars	1963 Million dollars		
<u>Diet-adequate</u>				
Canada.....	281	175	4.4	-38
Mexico.....	164	252	6.3	54
Brazil.....	762	493	12.3	-35
River Plate.....	176	152	3.8	-14
Northern Europe.....	176	315	7.8	79
Southern Europe.....	102	136	3.4	33
Eastern Europe.....	19	45	1.1	137
USSR.....	3	2	0.1	-33
Southern Africa.....	38	46	1.1	21
Japan.....	226	423	10.5	87
Oceania.....	35	47	1.2	34
Total and average.....	1,982	2,086	52.0	5
<u>Diet-deficit</u>				
Central America and Caribbean.....	687	412	10.3	-40
Other South America.....	454	405	10.1	-11
North Africa.....	49	49	1.2	0
West Central Africa.....	207	205	5.1	-1
East Africa.....	65	99	2.5	52
West Asia.....	81	97	2.4	20
India.....	102	78	1.9	-24
Other South Asia.....	66	56	1.4	-15
Other East Asia.....	798	524	13.1	-34
Communist Asia.....	27	0	0	0
Total and average.....	2,536	1,925	48.0	-24
Total all subregions.....	4,518	4,011	100.0	-11

Table 31.--United States food exports by subregion, average 1959-61 and projected 1970

Subregion	Value ^{1/}		Change 1959-61 to 1970	Distribution	
	1959-61	1970		1959-61	1970
	Million dollars	Million dollars	Percent	Percent	Percent
<u>Diet-adequate</u>					
Canada ^{2/}	367.2	495.4	35	11.5	10.3
Mexico	37.3	37.3	0	1.2	.8
River Plate.....	8.8	2.2	-75	.3	3/
Northern Europe	912.1	1,281.3	40	28.5	26.8
Southern Europe.....	243.0	292.0	20	7.6	6.1
Eastern Europe	142.6	147.4	3	4.4	3.1
USSR.....	5.2	0	0	.2	0
Southern Africa	9.4	23.1	146	.3	.5
Japan.....	209.6	491.6	135	6.5	10.3
Oceania.....	3.9	4.4	13	.1	.1
Total and average.....	1,939.1	2,774.7	43	60.6	58.0
<u>Diet-deficit</u>					
Central America and Caribbean	144.6	90.1	-38	4.5	1.9
Other South America ^{4/}	201.7	328.1	63	6.3	6.8
North Africa.....	184.3	303.7	65	5.8	6.3
West and Central Africa.....	30.8	60.8	97	1.0	1.3
East Africa.....	4.8	7.8	62	.1	.2
West Asia.....	179.3	275.8	54	5.6	5.7
South Asia ^{5/}	333.6	668.3	100	10.4	14.0
Other East Asia.....	181.4	276.8	53	5.7	5.8
Communist Asia.....	0	0	0	0	0
Total and average.....	1,260.5	2,011.4	60	39.4	42.0
Total all subregions	3,199.6	4,786.1	50	100.0	100.0

^{1/} Computed value based on weighted average prices per ton during 1959-61. See Appendix for unit value weights. ^{2/} Includes transshipments. ^{3/} Less than .05 percent. ^{4/} Includes Brazil. ^{5/} Includes India.

exports of such commodities to 1970. Food exports averaged \$3.2 billion in 1959-61. These are projected to increase 50 percent by 1970 to \$4.8 billion. In 1959-61, food commodities constituted about 70 percent of U.S. agricultural exports. On the same basis, total agricultural exports would be \$6.9 billion in 1970.

Commodities: In 1959-61, grains accounted for about 58 percent of U.S. food exports; wheat was the leading commodity, contributing 34 percent. Fats and oils accounted for 23 percent, of which vegetable oil and oilseeds were 17 percent, and lard and tallow 5 percent. In 1970 it is projected that these commodities will still account for about 80 percent of U.S. food exports, although the proportion from each is expected to change.

Although total wheat exports are expected to increase 27 percent by 1970, wheat's share of total exports will decrease from 34 percent to 29 percent. Rice exports are expected to increase about 53 percent during the 1960's but will continue to be a small part of U. S. food exports. Coarse grains are projected to increase 55 percent during the 1960's and will remain about one-fifth of the total.

The greatest increase in food exports is expected in vegetable oil and oilseeds. These are expected to increase 90 percent from 1959-61 to 1970 and their share of the U. S. export food market from 17 percent to 21 percent.

Meat other than poultry is projected at 93 percent higher and poultry and fruits are expected to increase by nearly one-half.

Major U.S. markets are in diet-adequate areas

U.S. TRADE IN AGRICULTURAL PRODUCTS

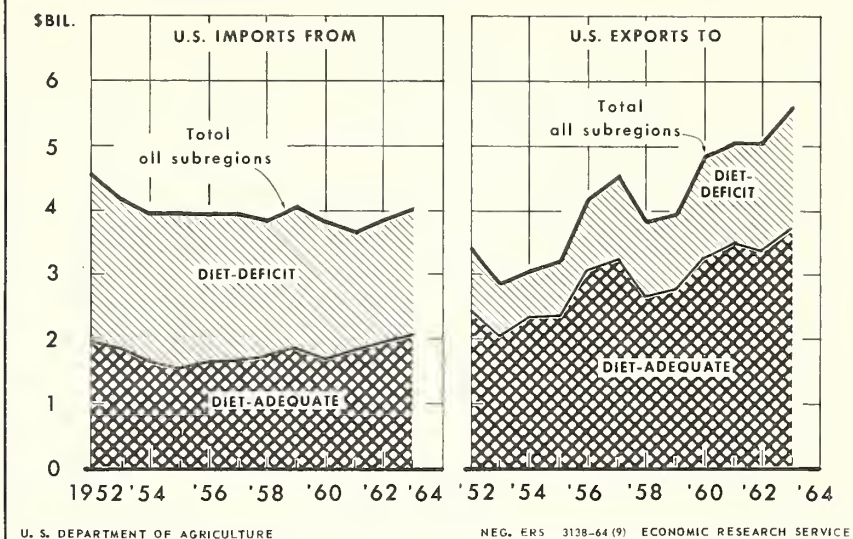


FIGURE 12

Destination: The largest increase in U. S. food exports by 1970 is expected to occur in the diet-deficit areas. Food exports are expected to increase 60 percent in these areas, while exports to diet-adequate regions are projected to increase 43 percent. The value of U. S. food exports, however, will still be larger to diet-adequate areas, which took 61 percent of the total in 1959-61 and are expected to take 58 percent by 1970. Increases are projected for all subregions of the world except Mexico, the River Plate, the USSR, Central America and the Caribbean, and Communist China (with which no export trade is expected).

Northern Europe is the best subregional customer for U. S. food commodities. Countries of this area took 29 percent of U. S. food exports in 1959-61 and are expected to take 27 percent in 1970. Increases are expected in all food groups, principally in coarse grains, vegetable oil and oilseeds, fresh and processed fruits, fresh and processed vegetables, and meat other than poultry.

Table 32.--United States food exports, by subregion, average 1959-61 and projected 1970

Subregion	Wheat and products ^{1/}		Milled rice ^{1/}		Coarse grains ^{1/}		Vegetable oil and oilseeds ^{2/}		Lard and tallow		Fruits ^{3/}		Vegetables ^{3/4/}		Pulses	
	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970
----- 1,000 metric tons -----																
Diet-adequate																
Canada	5/203	5/300	18	50	5/971	5/1,200	5/128	5/209	18	32	1,220	1,596	415	429	8	11
Mexico	10	0	8	0	112	50	7	1	8	5	14	15	14	11	22	17
River Plate	81	0	1	0	54	25	0	0	1	0	0	0	3	4	0	0
Northern Europe ...	1,629	1,600	136	152	8,013	11,080	424	664	354	421	480	885	80	191	113	140
Southern Europe ...	1,532	430	7	8	669	1,900	189	280	140	172	7	10	3	10	5	5
Eastern Europe	1,368	800	11	14	343	550	63	96	37	86	3	4	0	1	3	3
USSR	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0
Southern Africa ...	0	110	31	82	1	0	0	0	24	18	1	2	3	4	0	0
Japan	935	1,600	0	0	732	2,400	198	520	158	178	14	70	2	6	3	12
Oceania	3	0	4	4	0	0	1	0	0	0	6	10	6	9	1	2
Total	5,761	4,840	216	310	10,895	17,205	1,010	1,770	770	912	1,745	2,592	526	665	155	190
Diet-deficit																
Central America and Caribbean ..	440	370	72	57	113	94	144	6	104	43	26	40	49	30	45	24
Other South America ..	1,960	3,225	32	36	167	262	44	110	34	59	52	60	19	20	27	38
North Africa	1,984	2,535	19	26	436	355	57	226	34	79	1	2	2	1	0	1
West Central Africa ..	155	340	87	102	47	84	0	0	1	14	1	2	3	4	0	0
East Africa	35	90	1	5	43	10	0	0	1	0	0	0	0	0	0	0
West Asia	1,656	1,640	43	44	500	580	89	300	14	59	5	7	4	5	1	1
South Asia	4,028	7,120	266	500	136	560	50	230	11	39	0	0	1	0	0	1
Other East Asia	1,131	1,640	213	370	232	350	45	89	33	65	39	70	23	40	0	0
Communist Asia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	11,389	16,960	733	1,140	1,674	2,295	429	961	232	358	124	181	101	100	73	65
Total all subregions ..	17,150	21,800	949	1,450	12,569	19,500	1,439	2,731	1,002	1,270	1,869	2,773	627	765	228	255
Percent change 1959-61 to 1970	27.1		52.8		55.1		89.8		26.7		48.4		22.0		11.8	

Continued-

Table 32.--United States food exports, by subregion, average 1959-61 and projected 1970--Continued

Subregion	Butter		Poultry meat		Other meat		Nonfat dry milk		Canned milk		Dry whole milk		Eggs	
	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970
----- 1,000 metric tons -----														
<u>Diet-adequate</u>														
Canada	0	.1	6.2	0	19.9	49.9	.1	.1	.1	.1	.2	.2	1.6	3.0
Mexico	0	0	.3	1.8	15.1	15.9	11.1	36.3	8.9	11.3	.1	.5	.7	1.0
River Plate	0	0	0	0	0	0	.9	1.4	0	0	0	0	0	0
Northern Europe	2.4	6.8	56.0	49.9	52.0	97.5	.1	15.9	.1	.2	.1	.9	3.2	2.6
Southern Europe .....	.5	4.5	1.4	5.0	1.6	1.8	37.5	72.6	0	.1	.7	2.3	1.1	1.0
Eastern Europe	0	4.5	0	0	0	0	24.3	38.5	0	0	0	0	0	0
USSR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Southern Africa	0	.1	0	0	0	0	0	.3	0	0	0	0	0	0
Japan .....	.8	2.3	.2	6.8	0	.5	33.2	102.1	.1	.1	.1	.2	.1	1.0
Oceania	0	0	.3	.1	.1	.1	2.3	2.7	.3	.1	0	0	0	0
Total	3.7	18.3	64.4	63.6	88.7	165.7	109.5	269.9	9.5	11.9	1.2	4.1	6.7	8.6
<u>Diet-deficit</u>														
Central America and Caribbean .....	.4	1.8	5.6	21.3	2.3	11.3	11.3	20.4	.6	.5	.1	.2	1.2	1.0
Other South America .....	.7	2.7	.5	2.3	0	0	34.0	79.4	.2	3.1	8.4	4.5	7.5	5.0
North Africa	0	6.8	.4	2.5	0	0	21.7	43.1	0	0	0	.1	0	0
West Central Africa	0	2.3	1.3	4.5	0	.1	9.8	22.7	2.9	2.3	.8	3.9	.1	.2
East Africa	0	0	0	.5	0	0	.6	2.3	0	0	0	0	0	0
West Asia	0	1.9	1.0	2.7	.9	1.8	16.8	22.7	.1	.1	0	0	0	0
South Asia	0	.2	0	.1	0	0	41.7	68.0	.1	6.4	.1	.5	0	0
Other East Asia	1.1	2.3	4.8	15.9	2.3	2.5	42.5	61.2	47.7	27.9	.2	.3	0	0
Communist Asia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2.2	18.0	13.6	49.8	5.5	15.7	178.4	319.8	51.6	40.3	9.6	9.5	8.8	6.2
Total all subregions ..	5.9	36.3	78.0	113.4	94.2	181.4	287.9	589.7	61.1	52.2	10.8	13.6	15.5	14.8
Percent change 1959-61 to 1970	515.3		45.4		92.6		104.8		-14.6		25.9		-4.5	

1/ Fiscal year beginning July 1. 2/ Oil and the oil equivalent of oilseeds. 3/ Fresh equivalent of fresh and processed.

4/ Includes potatoes. 5/ Includes quantity for transshipment. 6/ Includes Brazil. 7/ Includes India.

South Asia (including India), which took 10 percent of U.S. food exports during 1959-61, is expected to increase this proportion to 14 percent by 1970. Major increases are expected in wheat, rice, coarse grains, vegetable oil and oilseeds, lard and tallow, and dairy products.

U.S. food exports to Canada are expected to increase 35 percent by 1970. Significant increases are expected in lard and tallow, fresh and processed fruits, pulses and nuts, and meat other than poultry. Grains and oilseeds are exported to Canada for transshipment.

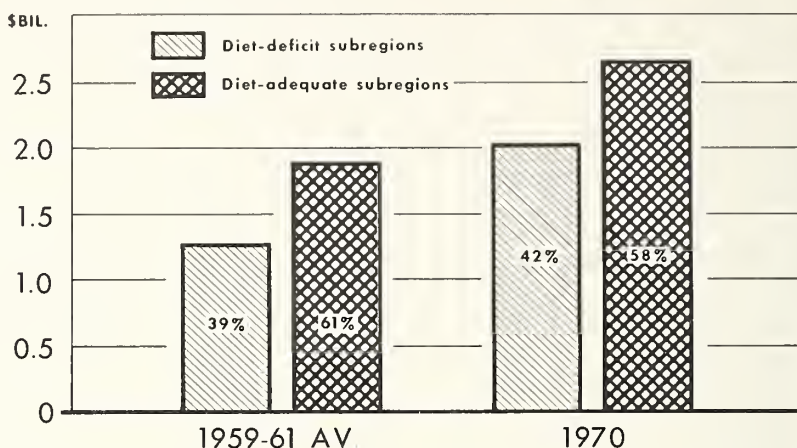
Southern Europe's share of U. S. food exports is expected to decline from an average of about 8 percent in 1959-61 to 6 percent in 1970, while projected exports will increase by about 20 percent. Projections of coarse grains show a 184 percent increase from 1959-61. Partly offsetting, however, will be wheat exports to the area; they are expected to decline about 1.1 million metric tons. An improved market is expected for vegetable oil and oilseeds and lard and tallow. Exports of poultry products and dairy products to the subregion are projected to gain somewhat.

Food exports to Japan are expected to increase 135 percent by 1970. This increase, tied to a large export base in 1959-61 (6.5 percent of the total), continues Japan as the most important single customer for U.S. food products. The percentage of U.S. food exports going to Japan probably will increase to 10.3 percent by 1970. Increases are projected mainly in coarse grains, vegetable oil and oilseeds, nonfat dry milk, fresh and processed fruits, and wheat.

Food exports to South America (excluding

U.S. food shipments to expand; deficit area share to rise

VALUE OF U.S. FOOD EXPORTS



U. S. DEPARTMENT OF AGRICULTURE

NEG. ERS 3139-64 (9) ECONOMIC RESEARCH SERVICE

FIGURE 13

River Plate) in 1970 are projected at a 63 percent higher level than in 1959-61. This would increase the percentage of U.S. food exports from 6 percent in 1959-61 to 7 percent in 1970. Most substantial increases are projected for wheat, coarse grains, vegetable oil and oilseeds, lard and tallow, and nonfat dry milk.

U.S. food exports to North Africa are expected to increase about 65 percent in the 1960's. This will give North Africa a 0.5 percent increase in the share of the total. Wheat exports are expected to increase from 2.0 million metric tons to 2.5 million. Coarse grains will decrease somewhat, but vegetable oil and oilseeds are projected to increase to about four times the 1959-61 level. Lard, tallow, and nonfat dry milk are also expected to more than double 1959-61 exports to this area.

Southern Africa is expected to receive the greatest percentage increase in U.S. food exports of all the subregions. This is due largely to anticipated wheat shipments of 110,000 metric tons in 1970 compared to none in 1959-61, and rice exports increasing from 31,000 metric tons to about 82,000.

Food Aid

American farm products have always been an important part of U.S. foreign assistance programs, especially since World War II.

Beginning with the European recovery program in 1948 through 1954, about \$6 billion worth of agricultural commodities were provided as a part of U.S. assistance. In 1954, with the enactment of Public Law 480--The Agricultural Trade Development and Assistance Act--increased emphasis was given to the role of U.S. agricultural commodities in feeding and clothing hungry people and promoting foreign economic growth.

In fiscal years 1955-64, the United States provided--mainly to developing countries--\$14 billion of agricultural products under Government programs, about one-third of the total agricultural exports during that period. About \$11 billion were shipped under P.L. 480.

Trends in Concessional Exports

Agricultural exports under Government export programs to the diet-deficit subregions

increased over 4 times during the past 9 years--from \$272 million in fiscal year 1955 to \$1,171 million in fiscal year 1963. During the same period, program exports to the diet-adequate subregions declined nearly half--from approximately \$600 million in fiscal year 1955 to \$363 million in fiscal year 1963.

About 70 percent of the total value of program exports in fiscal year 1955 went to the diet-adequate subregions; more than half went to Europe. In fiscal year 1963, however, these regions received only 24 percent of the total value of exports under Government programs; and only about 15 percent went to Europe. This decline has been more than offset by increases in dollar sales of agricultural commodities to these regions.

Northern Europe, Southern Europe, and Eastern Europe accounted for about 80 percent of the total value of concessional exports to the diet-adequate subregions during the 9-year period. Japan and Brazil accounted for nearly all of the rest. Since the economic recovery of Western Europe and Japan, chief recipients of concessional program exports have been Eastern Europe and Brazil. In

fiscal year 1963, these regions accounted for about three-fourths of the total value of concessional exports to the diet-adequate areas.

U. S. agricultural shipments under Government programs to the diet-deficit subregions rose during the 9-year period. (No exports have been made to Communist Asia.) In 1963, India (\$325 million) was the largest recipient of U.S. concessional exports, followed by Other East Asia, North Africa, West Asia, and Other South Asia.

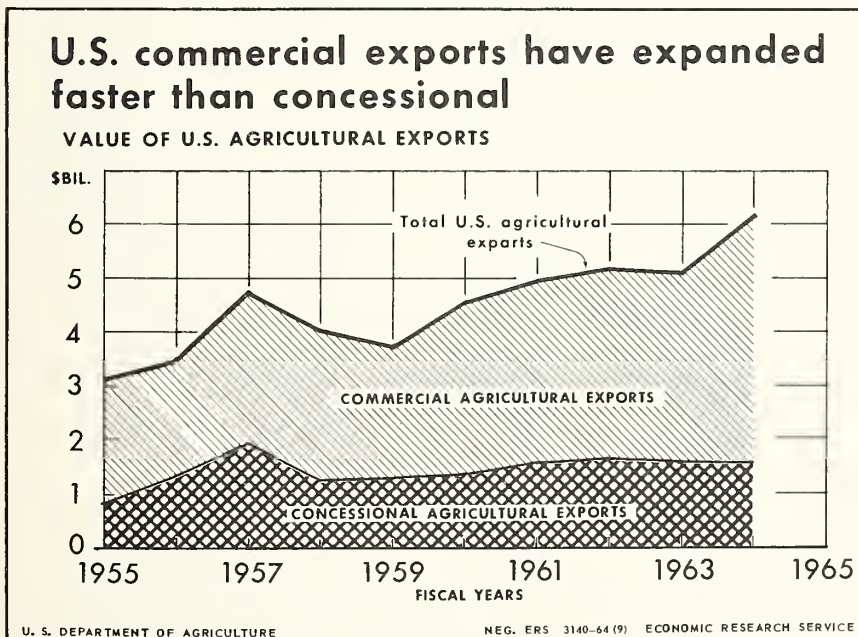


FIGURE 14

These 5 regions received about 91 percent of the total value of concessional exports to the diet-deficit subregions in fiscal year 1963.

Food exports by programs: In fiscal year 1963, program shipments accounted for nearly 60 percent of U.S. wheat exports, about 70 percent of U.S. exports of edible vegetable oil, and nearly half of U.S. rice exports. Program exports are also important for pulses and dairy products. Less than a third of the value of U.S. exports of coarse grains are under Government programs; the bulk of these exports, principally corn, go to the European commercial markets for livestock feeding.

Wheat, coarse grains, rice, and edible vegetable oil accounted for nearly three-fourths of the total value of all U.S. agricultural products exported under Government programs in 1959-61. About 90 percent of the total value of these exports were shipped under P.L. 480--the Food for Peace Program.

The largest P.L. 480 program is under Title I, which provides for the sale of U.S.

agricultural commodities under agreements with friendly countries, with payment therefor in their own currencies. In 1959-61, about 70 percent of Government program exports of wheat and rice, nearly all of the edible vegetable oil, and about 40 percent of the coarse grains were shipped under this legislative authorization.

Although the value of program exports under Title II of P.L. 480 is considerably less than under Title I, this program plays an important role in meeting famine or other urgent relief requirements of foreign countries. Title II also authorizes the use of surplus agricultural commodities for economic development.

Under Title III of P.L. 480 surplus foods are donated to nonprofit voluntary agencies, which distribute them to needy people and school feeding programs in friendly countries. Donations under Title III, have been increasing in recent years. In 1963, they were valued at \$277 million and principally included wheat, wheat flour, dry milk, bulgur, and corn. These foods were distributed to

Table 33.--United States agricultural exports under Government-financed programs and commercial sales, fiscal years 1955-64

Fiscal year	Government financed programs	Commercial	Total	Program exports as percentage of total
	Million dollars	Million dollars	Million dollars	Percent
1955.....	866	2,278	3,144	28
1956.....	1,416	2,080	3,496	41
1957.....	2,004	2,724	4,728	42
1958.....	1,246	2,757	4,003	31
1959.....	1,259	2,460	3,719	34
1960.....	1,304	3,213	4,517	29
1961.....	1,557	3,389	4,946	31
1962.....	1,634	3,507	5,141	32
1963.....	1,534	3,544	5,078	30
1964.....	1,550	4,565	6,115	25
Total 1955-64.....	14,370	30,517	44,887	32

77 million people in 114 countries, including 36 million school children.

Title III also provides for trading U.S. surplus agricultural commodities for materials from foreign nations for the supplemental stockpile and for materials needed by the United States for military and economic assistance programs abroad. Significant quantities of wheat and coarse grain were bartered during 1959-61 for strategic materials.

Title IV, enacted in September 1959, provides for long-term dollar credit sales of U.S. agricultural commodities. The first Title IV agreement was in August 1961. Through December 31, 1963, the export market value of agricultural commodities shipped under Title IV was approximately \$91 million.

Projection of Food Aid 16/

The increase in the value of dollar sales of U. S. food exports during the 1960's is expected to be substantially greater than the increase in the value of exports of food commodities under Government-financed programs. During this period, U. S. food exports under concessional programs are expected to

maintain about the same ratio to dollar sales. Considering U. S. exports of all agricultural commodities, the proportion shipped under programs in 1970 will be somewhat lower than for food commodities alone. The breakdown of U. S. food exports by commercial and concessional sales (in million dollars) is as follows:

	1959-61	1970
Commercial	2,050	3,036
Concessional	<u>1,150</u>	<u>1,750</u>
Total	3,200	4,786

The increase in program exports during the 1960's will be to the diet-deficit regions to meet increasing needs for food products resulting from population growth and rising levels of living. Wheat exports in the 1960's, principally to South Asia and South America, probably will account for more than two-fifths of the total increase in value of food exports under concessional programs. It is also expected that increases in program exports of wheat to the diet-deficit subregions

16/ In this section, Brazil, although diet-adequate, is included in Other South America, and India is combined with Other South Asia.

Table 34.--United States agricultural exports under Government-financed programs, by subregion, fiscal years 1955-63

Subregion	1955	1956	1957	1958	1959	1960	1961	1962	1963
----- Million dollars -----									
Diet-adequate									
Canada.....	0	0	0	0	2.9	0	0	0.1	0
Mexico.....	0.1	10.0	8.4	19.0	12.7	0.8	2.1	4.5	9.5
Brazil.....	1.7	30.4	27.7	11.2	31.0	57.3	61.6	100.1	93.2
River Plate.....	2.7	20.1	5.5	0.7	4.6	29.3	0.2	0.2	1.6
Northern Europe.....	239.8	446.6	454.6	178.9	139.5	147.9	83.6	57.2	17.2
Southern Europe.....	171.7	256.3	363.5	195.5	205.9	114.0	172.4	114.0	45.9
Eastern Europe.....	125.8	98.1	121.2	156.7	160.4	112.7	190.0	172.7	170.4
USSR.....	0	0	0	0	0	0	0	0	0
Southern Africa.....	0	0	0.8	0	2.3	2.7	0	0	0.1
Japan.....	53.0	181.8	190.8	40.9	15.2	19.2	20.2	34.1	25.5
Oceania.....	0	0	0	2.0	4.9	0	0	1.6	0
Total.....	594.8	1,043.3	1,172.5	604.9	579.4	483.9	530.1	484.5	363.4
Diet-deficit									
Central America and Caribbean.....	3.1	7.9	9.2	6.6	6.6	6.6	5.1	12.2	16.7
Other South America.....	15.7	43.5	68.1	52.5	30.4	28.9	37.9	72.7	54.5
North Africa.....	19.1	45.3	13.2	19.5	46.6	118.8	154.0	276.7	238.8
West Central Africa.....	0	0.2	0.5	0.1	3.4	5.8	11.3	21.8	29.5
East Africa.....	0	0	0.1	0.6	1.6	0.9	3.0	19.7	6.9
West Asia.....	88.9	64.1	170.7	108.9	89.1	134.4	184.4	231.3	123.6
India.....	28.9	35.3	176.5	174.3	250.2	259.0	312.9	200.7	325.5
Other South Asia.....	7.8	50.1	89.6	89.4	64.7	76.9	114.6	89.4	123.3
Other East Asia.....	108.0	126.6	303.9	189.5	187.0	188.9	203.6	224.5	252.3
Communist Asia.....	0	0	0	0	0	0	0	0	0
Total.....	271.5	373.0	831.8	641.4	679.6	820.2	1,026.8	1,149.0	1,171.1
Total all subregions.....	866.3	1,416.3	2,004.3	1,246.3	1,259.0	1,304.1	1,556.9	1,633.5	1,534.5

in the 1960's will be accompanied by substantial increases in dollar sales of wheat to South America, East Africa, and West Central Africa.

Wheat exports--both commercial and concessional--to the diet-adequate subregions will be less in value in 1970 than in 1959-61. The amount of this decrease is expected to be about a fifth of the increase in the value of agricultural exports to the diet-deficit subregions during the same period.

The decline in wheat exports to the diet-adequate area during the

Most U.S. concessional exports now go to diet-deficit areas

VALUE OF U.S. AGRICULTURAL EXPORTS UNDER GOVERNMENT PROGRAMS

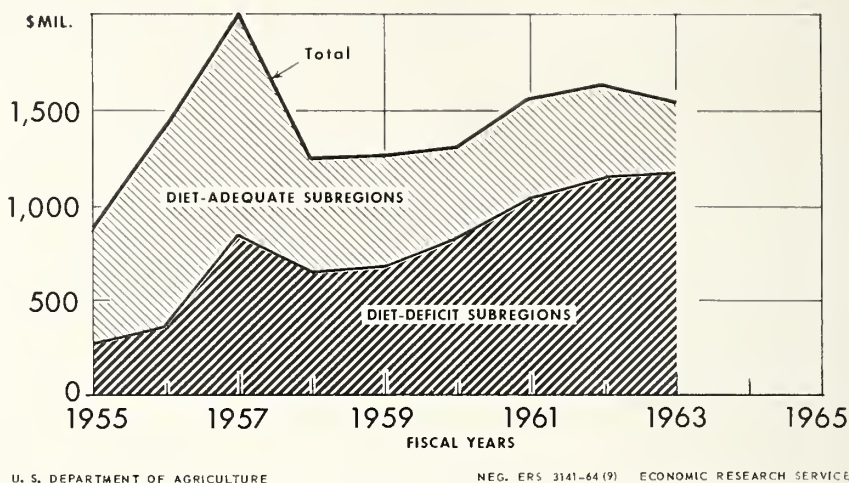


FIGURE 15

Table 35.--United States exports of specified food commodities by program, average 1959-61

Program	Wheat ^{1/}	Coarse grains	Rice, milled	Edible vegetable oils
----- Million dollars -----				
P. L. 480:				
Title I.....	511.0	59.8	43.4	76.6
Title II.....	79.1	17.9	4.0	0
Title III				
Barter.....	48.5	50.2	2.5	0
Donations.....	2.0	15.1	9.5	1.6
Total.....	640.6	143.0	59.4	78.2
Mutual security.....	95.3	12.7	0.4	5.3
Commercial sales.....	295.4	366.2	60.5	70.2
Total exports.....	1,031.3	521.9	120.3	153.7

^{1/} Wheat and wheat equivalent of flour.

1960's will be greatly offset by the increase in U.S. sales of coarse grains to the same area during the same period. About 90 percent of the expected increase in U.S. coarse grain exports during the 1960's will go to the diet-adequate area--nearly all for dollars. Most of this increase will go to Europe and Japan.

Substantial increases in value of rice exports--both commercial sales and program shipments--are expected to occur during the 1960's. The largest gains in dollar sales are expected in Canada, Europe, and South Africa. Program exports, which likely will account for about 80 percent of the increase, will go principally to South and East Asia.

Exports of vegetable oil and oilseeds will undoubtedly make substantial gains in value in both the diet-adequate and diet-deficit subregions in the 1960's. Increases in the value of dollar sales of oilseeds to the diet-adequate area--chiefly Japan and Europe--are expected to be substantially greater than the value of Government program exports of vegetable oil to the diet-deficit area.

Program exports and dollar sales of dairy products, principally butter and nonfat dry milk, and

U.S. concessional exports shifting to deficit areas

VALUE OF U.S. AGRICULTURAL EXPORTS

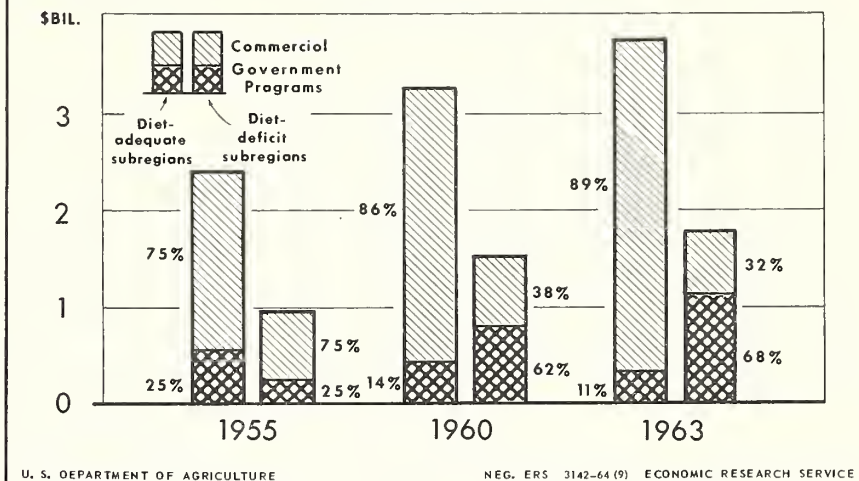


FIGURE 16

U.S. food exports up 50% by 1970

VALUE OF U.S. FOOD EXPORTS

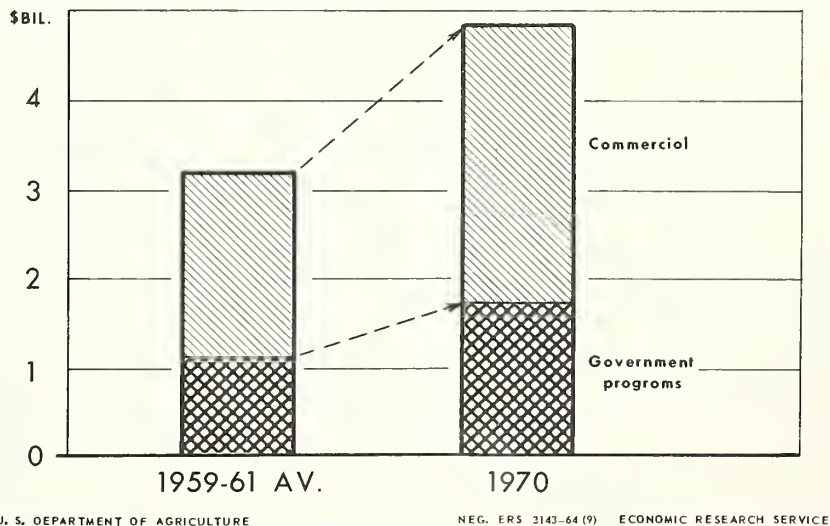


FIGURE 17

poultry, pulses, lard and tallow are expected to be higher in value in 1970 than the average annual value for 1959-61.

While a substantial increase in the total value of concessional program exports is expected by 1970, there will likely be some shifts in the relative importance of the various Government programs. An increasing number of recipients of U.S. food donations are moving up from straight relief-feeding to self-help programs, utilizing food which will contribute to economic development. Participating countries will be encouraged to shift from foreign currency purchases to dollar credit and cash purchases as their economies improve.

Impact of Food Aid

During the past 10 years, the Food for Peace Program has proven effective in helping close the food gap in the diet-deficit subregions. Hundreds of millions of people receive food which otherwise would not have been available to them. Millions of children benefited from school feeding programs. The primary impact of program exports has been in relieving severe food shortages, maintaining and raising per capita food consumption, and improving diets nutritionally.

The use of U.S. food has promoted economic growth and development of less developed countries. In the case of Israel this was clearly established by the Title I, P. L. 480 study done by the Bank of Israel. (22) Shipments of U.S. food have aided economic growth in several ways. Food shipments have helped ease inflationary pressures which otherwise would have jeopardized development in developing countries. They have helped improve the health and increase the productivity of the labor force. And they have helped raise the level of real income, which is essential to domestic capital accumulation.

Direct food shipments are being widely used as part payment of wages for work

on construction projects. Although the "Food-for-Work" programs are relatively new, projects are now active in 22 countries, giving employment to an estimated 700,000 workers and providing food to more than 4 million persons.

Foreign currencies received by the U.S. Government in payment for agricultural products shipped under Title I of P.L. 480 also contribute to economic development. From the beginning of the Food for Peace Program in 1954, through 1963, a little more than \$4.3 billion equivalent in foreign currency has been earmarked for economic development loans to governments receiving P.L. 480 commodities. Every effort is made to coordinate the use of such loans with other forms of U.S. assistance.

Food shipments under Food for Peace have also been beneficial to the United States by contributing significantly to the expansion of trade and the development of new markets for U.S. agricultural products. Originally conceived largely as a measure for disposing of farm surpluses, Food for Peace has evolved as an effective tool in support of U.S. trade and foreign policy goals. It has contributed to an expansion in dollar sales of U.S. agricultural products abroad. Food products have helped developing countries achieve more rapid economic growth. Economic growth has made it possible for people to purchase more and better quality food, and has promoted an increase in commercial food imports.

While U.S. food aid will likely continue to play an important role in helping developing countries meet emergency needs and achieve more rapid economic growth, food aid is at best a temporary and an inadequate measure. Higher food production is the only permanent way to overcome the food gap in most diet-deficit countries, although in some countries, development of nonfarm resources will result in foreign exchange earnings that can be used to pay for commercial imports of food.

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APPENDIX

Subregions

Countries and territories were grouped into 22 subregions. Criteria for the groupings included geographic proximity and similarities in food production and use. Some countries constituted separate subregions themselves because of size and variation from nearby countries.

Countries and territories in the 22 subregions are shown below. For each subregion, countries for which food balances were constructed are listed (in order of population in 1959-61), then other areas are listed for which combined estimates were made of food supply and utilization.

Western Hemisphere

1. United States (excluding Alaska and Hawaii)
2. Canada
3. Mexico
4. Central America and Caribbean--
Cuba, Haiti, Guatemala, Dominican Republic, El Salvador, Honduras, Jamaica, Nicaragua, Costa Rica, Panama, Trinidad and Tobago, British Honduras,
Others: Puerto Rico, Windward Islands, Leeward Islands, Bahamas, Bermuda and Virgin Islands
5. Brazil
6. River Plate--Argentina, Uruguay
7. Other South America--Colombia, Peru, Chile, Venezuela, Ecuador, Bolivia, Paraguay,
Others: British Guiana, Surinam and French Guiana

Europe

8. Northern Europe--West Germany, United Kingdom, France, Netherlands, Belgium-Luxembourg, Sweden, Austria, Switzerland, Denmark, Finland, Norway, Ireland,
Others: Iceland and Greenland

9. Southern Europe--Italy, Spain, Portugal, Greece,
Others: Malta and Gozo
10. Eastern Europe--Poland, Yugoslavia, Rumania, East Germany, Czechoslovakia, Hungary, Bulgaria,
Other: Albania
11. USSR

Africa and West Asia

12. North Africa--UAR (Egypt), Ethiopia, Sudan, Morocco, Algeria, Tunisia, Libya
13. West Central Africa--Nigeria, Congo (Leopoldville), Ghana, Angola, Cameroon, Ivory Coast, Guinea, Sierra Leone, Togo, Liberia,
Others: Upper Volta, Mali, Niger, Senegal, Chad, Dahomey, Central Africa Republic, Congo (Brazzaville), Portuguese West Africa, Mauritania, Gabon, Gambia, and Spanish West Africa.
14. East Africa--Tanganyika, Fed. of Rhodesia and Nyasaland ^{17/}, Kenya, Malagasy Republic,
Other: Uganda, Mozambique, Rwanda, Burundi, Somali, Mauritius, Reunion, Zanzibar ^{18/}, Seychelles, and French Somaliland
15. Southern Africa--Republic of South Africa,
Others: Basutoland, Southwest Africa, Bechuanaland, and Swaziland
16. West Asia--Turkey, Iran, Iraq, Syria, Israel, Lebanon, Jordan, Cyprus,
Others: Saudi Arabia, Yeman, Aden, and other Arabian states

Far East

17. India
18. Other South Asia--Pakistan, Ceylon,
Others: Afganistan, Nepal, Bhutan, and Sikkim

^{17/} Now separate countries; Malawi (Nyasaland), Zambia (Northern Rhodesia), and Rhodesia (Southern Rhodesia).

^{18/} Now united with Tanganyika.

19. Japan
20. Other East Asia--Indonesia,
Philippines, Thailand, Burma,
Taiwan, Malaya, ^{19/}
Others: South Korea, South Vietnam,
Cambodia, Hong Kong, Laos,
Singapore, Sarawak, Sabah, Brunei,
Melanesia, Micronesia, Polynesia,
and Ryukyu Islands.
21. Communist Asia--Mainland China
Others: North Vietnam, North Korea,
and Mongolia
22. Oceania--Australia, New Zealand

^{19/} Now combined with Singapore, Sarawak, and Sabah to form Malasia.

Food Groups

Wheat is shown as grain; trade includes the wheat equivalent of flour.

Rice is shown as paddy or rough rice.

Other grains include corn, barley, oats, rye, millet, and sorghum, as well as minor products such as buckwheat, quinoa, spelt, and teff. Trade generally includes edible products but not mixed feeds or byproducts.

Other starchy crops include potatoes, sweetpotatoes, yams, cassava, and similar tropical root crops. For European countries, exports generally and imports occasionally include the potato equivalent of starch. In some cases the exports also include the potato equivalent of starch products.

This group of commodities also includes bananas and plantains in countries which produce such crops abundantly, since these fruits provide cheap calories in such cases. However, in countries which import bananas, these fruits are classed with other fruits. Consequently, trade figures for these groups of commodities are out of balance to an unusual degree.

Pulses and nuts include beans, peas, lentils, chickpeas, and similar dry leguminous seeds. It also includes peanuts and soybeans in countries where they are used for food (thus excluding soybeans in the United States). Edible tree nuts, including coconuts, are classified in this group.

Sugar is basically raw cane and beet sugar, but honey, maple sugar, edible molasses, syrup, and palm sugar are also included for some countries.

Vegetables and fruits exclude commodities classified as other starchy crops. Trade statistics are generally on product-weight basis, but for European countries they are mostly on a fresh equivalent basis. For most of the diet-deficit areas, basic statistics are incomplete and the data used here are only approximate.

Fats and oils include butter (fat content), edible animal fats, marine oils, and vegetable oils which may be used for food. Oilseeds are not included in production or exports in tables 36 and 37, but for several European countries the imports include the oil equivalent of edible oilseeds. U. S. exports of soybean oil, but not soybeans, are included. As a consequence, imports and exports are unbalanced. For Finland and the United Kingdom, margarine and shortening are included along with their constituent oils, thus causing some double counting in production.

Meat, fish, and eggs include poultry meat and game, in addition to other kinds of meat. Production of meat is generally on carcass-weight basis. Production of fish is generally on landed-weight basis, but for several European countries production is fillet-weight. Trade is usually in product-weight, except trade in egg products has usually been converted to shell-egg equivalent. Estimates of production and consumption of this group of commodities are necessarily only approximate.

Milk products include milk and milk products other than butter. Production refers to whole milk from cows, buffaloes, sheep, and goats. Nonfood use includes milk used for butter and whole milk fed to animals. Exports include the whole-milk equivalent of cheese, canned milk, and dried whole milk but no allowance for skim milk in any form, since the whole milk used for making skim milk was a part of the whole milk already allowed for making butter. The imports, on the other hand, include the whole-milk calorie equivalent of imported skim milk.

Methodology

Summary food balances, 1959-61: The basic source of data for table 36 was a set of food balance sheets showing food supplies in a 3-year period centering on either the calendar year 1960 or a fiscal year beginning in 1960 and ending in 1961. These food balances were prepared from data published by the Foreign Agricultural Service so far as possible, supplemented by statistics published by national governments, the Food and Agricultural Organization (FAO), the Organization for Economic Cooperation and Development (OECD), and by estimates made in ERS.

Food balances for the period 1959-61 were made for 92 countries, covering 94 per cent of the world's population. Estimates were made for the remaining countries in each region, generally by assuming a pattern of production and consumption per capita like the major countries in the region; but available statistics of production and trade published by FAS or FAO were also used.

The food balance for the United States refers to the population of 48 States plus all military personnel; thus, Hawaii and Alaska are omitted from the analysis.

World totals of imports and exports in table 36 are more unbalanced than normal for some commodities. This results from

the use of data from food balances, where the classification of commodities and the stage of processing represented by the data differed between importing and exporting countries. The imbalance for sugar is largely explained by the omission from world exports of sugar shipped from Hawaii to continental United States.

Projection of consumption: Demand projections are based on population growth and reflect changes in income. Reliable projections from secondary sources for population and income were utilized. Principal sources included USDA's long-term projection studies, the Agency for International Development, and recent work by U. S. Census Bureau and the United Nations Committee on Population. Population projections for 1970 were obtained for all food balance countries and all other countries and territories by subregions. Where data were available on national income and rate of economic growth, per capita income was projected to 1970. For major commodities within countries with income data and available income elasticities, per capita consumption was projected for 1970 considering the impact of changes in per capita income. Per capita consumption was then multiplied by projected population to obtain total consumption for each commodity. The following equation was used for projections of consumption:

$$C_{1970} = P_{1970} \frac{C_0}{P_0} (1 + I'E_i)^{10}$$

where C_0 is the consumption of the commodity in the base period, 1959-61; P_0 is the population in the base period; I' is the annual rate of per capita income growth; and E_i is the income elasticity for that commodity.

Where income data or income elasticities were not available, per capita consumption was projected by trend analysis and then multiplied by the population to give total consumption. As a check on the income model, trends in consumption between 1956-58 and 1959-61 were extrapolated to 1970 and unreasonable projections modified.

Projection of production: Production was projected by country and commodity largely by an extension of production trends of 1952-54, 1956-58, 1959-61, 1962, and 1963. For some countries and some commodities, historical trends included 1935-39. A linear trend was projected unless the points strongly indicated otherwise. Trends were adjusted according to country development plans. Projections from USDA's long-term projection studies were used where possible.

For grain commodities--and for all crops in the USSR and Eastern Europe--projections were also made of area and yield to test the reasonableness of the production projections.

Projections of imports and exports: Trade was projected independently as a check against consumption and production projections. Where reliable projections had already been made in other studies, they were used. If no other estimates for 1970 were available, the trend of 1956-58, 1959-61, and 1962 was extended to 1970.

Projections of nonfood uses: These uses were projected largely by trends or historical relationships. Estimates for the more developed countries were available for industrial use, seed, and feed requirements.

Projected food balances: The various elements as projected were entered into a food balance for 1970 and balanced by successive approximations. It was at this point that price effects were considered in balancing supply and demand in each country. Also, where commodities did not balance, analysis was made of production, consumption, and trade policies to determine where further adjustment in demand and supply would probably occur.

Projections for countries of the European Common Market considered the effect on demand and supply of price changes for grain and livestock.

Adequacy of diet: The food balances for 1959-61 and 1970 for each country were measured against nutritional reference standards that have been developed by the Consumer and Food Research Division of USDA's Agricultural Research Service. Countries whose diets were deficient in calories, total protein, animal protein, pulse protein, or fat were identified and the magnitude of the deficiency was calculated.

For a realistic measure of the deficits, they were expressed in terms of commodities which are of interest to the United States or which are commonly consumed in the countries.

Country food balances were summarized into 10 commodity groups and 22 subregions, and an average diet for each subregion was calculated. However, the magnitude of the deficit for a subregion was not determined by the average subregion diet but is a weighted average of the country deficits within the subregion.

Projection of U. S. exports: For principal commodities in which the United States has an export interest, projected imports for major countries were taken from the 1970 country food balances. The U. S. share of these imports was estimated by considering the trend in the U. S. share of the market, trade patterns of important competitors, and other factors affecting the U. S. share--such as the common agricultural policy of the Common Market, changes in trade policies of other countries, international commodity agreements, Food for Peace policies, and U. S. export price policies.

Value of food production, trade, and consumption: The value of food production was estimated for each subregion for 1959-61 by using uniform prices representing world average export unit values in 1959-61 for commodities significant in world trade and farm prices in major producing countries for other commodities. The quantities produced

in each subregion were estimated in part from the food balances, but since they did not cover all countries it was necessary to supplement the production figures from the food balances with data from other sources. The food commodities considered and their prices in dollars per metric ton were; wheat 63.2, paddy rice 74, corn 50.2, barley 51.4, oats 50.1, rye 49.4, sorghum and millet 47.2, mixed grain 50, potatoes 38.3, sweetpotatoes 15, cassava 12, bananas 77.7, pulses 134, soybeans 87.7, peanuts in shell 126, husked coconuts for fresh consumption 31, desiccated coconut 284, cocoa beans 599, raw centrifugal sugar 98.2, other sugar 88.4, dried fruits 190, citrus fruits 114, other fruits and vegetables 60, copra 172, sesame 179, rapeseed 120, cottonseed 73.8, sunflowerseed 60.7, palm kernels 150, olive oil 520, palm oil 204, meat 528, milk 72.9, and eggs 553.

To make projections to 1970 of the value of food production, the 1959-61 value for each

subregion for 9 of the 10 food groups was raised by the ratio of production in 1970 to production in 1959-61. For the group including meat, fish and eggs the 1959-61 values referred to meat and eggs only and the 1970 values were estimated by applying the 1959-61 prices to 1970 quantities.

The values of trade and consumption were computed by applying the same prices to the quantities shown in tables 36 and 37 for imports, exports, and supply for food. The computed value of trade and consumption included some processed commodities which were represented in the computed value of production by whole milk, meat and oilseeds. These were butter at \$810, vegetable oils at \$325, lard and shortening at \$256, evaporated and condensed milk at \$308, cheese at \$716, and nonfat dry milk at \$222 per metric ton. In the case of consumption, the value of fish was included at \$292 per metric ton.

Summary Food Balances

Table 36.--Supply and utilization of food by subregion, average 1959-61 ^{1/}

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
-----1,000 metric tons-----										
<u>Diet-adequate</u>										
United States										
Production.....	33,684	2,297	135,551	12,796	1,814	2,744	26,622	5,824	23,340	55,955
Imports.....	200	0	473	32	569	5,958	2,978	145	1,056	271
Exports.....	16,212	1,554	11,009	181	298	48	1,599	1,647	300	367
Changes in stocks...	1,470	-112	6,876	225	48	83	124	85	17	272
Nonfood use.....	2,685	161	113,543	4,192	271	75	3,147	239	3,541	14,231
Supply for food.....	13,517	694	4,596	8,230	1,766	8,496	24,730	3,998	20,538	41,356
Canada										
Production.....	10,764	0	11,010	1,906	59	208	1,861	414	2,717	8,533
Imports.....	0	52	573	109	65	774	1,197	11	83	60
Exports.....	8,970	1	1,289	102	11	14	122	3	478	384
Changes in stocks...	-2,168	0	-832	0	0	1	-7	14	-2	-8
Nonfood use.....	2,442	0	10,937	620	22	7	458	17	346	4,782
Supply for food.....	1,520	51	189	1,293	91	960	2,485	391	1,978	3,435
Mexico										
Production.....	1,286	280	5,427	948	868	1,620	3,085	278	1,058	2,803
Imports.....	4	11	41	4	25	20	33	12	3	109
Exports.....	0	8	152	18	19	416	320	0	83	0
Changes in stocks...	-88	26	-131	0	26	2	0	-13	0	0
Nonfood use.....	129	34	1,243	180	61	30	285	0	3	350
Supply for food.....	1,249	223	4,204	754	787	1,192	2,513	303	975	2,562
Brazil										
Production.....	377	4,763	8,529	23,497	2,541	3,757	5,192	490	2,643	5,046
Imports.....	1,911	0	31	6	12	0	97	9	32	0
Exports.....	0	79	5	410	223	727	134	0	58	0
Changes in stocks...	27	6	68	0	19	75	0	2	0	0
Nonfood use.....	108	532	6,105	6,506	305	0	471	0	31	549
Supply for food.....	2,153	4,146	2,382	16,587	2,006	2,955	4,684	497	2,586	4,497
River Plate										
Production.....	5,853	228	8,935	2,515	111	972	5,384	473	3,128	5,185
Imports.....	78	1	64	299	1	81	14	4	1	0
Exports.....	2,025	25	3,209	54	4	97	216	89	608	40
Changes in stocks...	-184	-8	36	5	1	47	-1	-1	1	0
Nonfood use.....	736	34	5,460	674	33	0	2,446	0	8	2,831
Supply for food.....	3,354	178	294	2,081	74	909	2,737	389	2,512	2,314
Northern Europe										
Production.....	22,442	114	41,525	63,526	734	6,841	27,210	2,792	20,026	88,077
Imports.....	10,899	764	16,039	1,689	1,167	4,261	10,878	4,346	3,507	3,431
Exports.....	3,151	119	3,200	2,104	291	1,785	1,504	1,196	3,150	4,360
Changes in stocks...	346	16	175	65	37	126	-36	17	31	0
Non-food use.....	9,330	114	50,529	39,793	389	168	8,253	1,216	1,885	41,268
Supply for food.....	20,514	629	3,660	23,253	1,184	9,023	28,367	4,709	18,467	45,880
Southern Europe										
Production.....	13,907	1,320	9,922	10,071	2,598	1,724	30,031	1,627	4,151	14,599
Imports.....	2,108	18	2,949	378	132	352	183	580	613	942
Exports.....	383	326	17	368	342	20	5,058	123	144	30
Changes in stocks...	-498	-37	73	0	1	4	24	130	-3	0
Nonfood use.....	1,835	65	11,455	2,568	1,075	4	4,050	257	64	4,172
Supply for food.....	14,295	984	1,326	7,513	1,312	2,048	21,082	1,697	4,559	11,339

Continued

Table 36.--Supply and utilization of food by subregion, average 1959-61--Continued

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
-----1,000 metric tons-----										
Eastern Europe										
Production.....	17,091	153	42,018	65,654	737	4,311	19,731	2,025	6,244	31,592
Imports.....	5,524	584	2,173	18	30	401	785	394	519	77
Exports.....	224	57	1,552	573	77	1,428	1,094	129	516	23
Changes in stocks...	282	97	386	0	24	235	0	18	0	0
Nonfood use.....	7,077	56	34,432	50,040	211	0	6,937	412	96	20,881
Supply for food.....	15,032	527	7,821	15,059	455	3,049	12,485	1,860	6,151	10,765
USSR										
Production.....	50,085	218	47,599	85,087	2,950	5,781	20,838	3,887	13,005	52,867
Imports.....	362	621	54	0	47	1,892	805	126	194	0
Exports.....	5,647	0	1,603	0	0	480	0	197	179	24
Changes in stocks...	-1,000	0	283	0	0	697	0	0	0	0
Nonfood use.....	15,434	28	32,008	51,530	2,032	0	5,102	1,204	1,109	29,364
Supply for food.....	30,366	811	13,759	33,557	965	6,496	16,541	2,612	11,911	23,479
Southern Africa										
Production.....	719	8	4,824	384	144	982	1,865	153	1,187	2,523
Imports.....	232	72	11	5	3	44	10	60	5	11
Exports.....	6	0	940	6	50	349	475	47	107	8
Changes in stocks...	9	0	116	0	-4	1	3	-3	-2	10
Nonfood use.....	78	0	1,672	125	22	0	143	57	56	924
Supply for food.....	858	80	2,107	258	79	676	1,254	112	1,031	1,592
Japan										
Production.....	1,576	15,740	2,603	10,094	863	195	12,927	402	7,397	1,905
Imports.....	2,675	268	1,750	0	972	1,317	146	442	40	208
Exports.....	35	0	0	28	23	21	133	124	328	0
Changes in stocks...	143	625	-46	0	7	14	0	6	0	0
Nonfood use.....	565	1,003	2,699	2,969	541	0	2,845	246	1,443	346
Supply for food.....	3,508	14,380	1,700	7,097	1,264	1,477	10,095	468	5,666	1,767
Oceania										
Production.....	6,447	124	3,033	718	44	1,356	2,151	496	2,693	11,765
Imports.....	194	4	0	2	28	124	69	61	35	38
Exports.....	4,134	88	1,057	10	23	771	182	277	905	897
Changes in stocks...	72	0	80	0	0	-3	0	2	0	0
Nonfood use.....	982	2	1,807	143	8	37	770	36	147	8,262
Supply for food.....	1,453	38	89	567	41	675	1,268	242	1,676	2,644
Total diet-adequate										
Production.....	164,231	25,245	320,976	277,196	13,463	30,491	156,897	18,861	87,589	280,850
Imports.....	24,187	2,395	24,158	2,542	3,051	15,224	17,195	6,190	6,088	5,147
Exports.....	40,787	2,257	24,033	3,854	1,361	6,156	10,837	3,832	6,856	6,133
Changes in stocks...	-1,589	613	7,084	295	159	1,282	107	257	42	274
Nonfood use.....	41,401	2,029	271,890	159,340	4,970	321	34,907	3,684	8,729	127,960
Supply for food.....	107,819	22,741	42,127	116,249	10,024	37,956	128,241	17,278	78,050	151,630
Diet-deficit										
Central America & Caribbean										
Production.....	24	780	2,124	6,247	557	9,445	3,401	130	871	2,271
Imports.....	892	570	119	67	71	6	96	143	112	204
Exports.....	1	9	51	1,590	76	8,340	255	7	26	0
Changes in stocks...	2	2	-11	0	0	140	0	0	0	0
Nonfood use.....	9	64	426	817	34	13	305	0	2	749
Supply for food.....	904	1,275	1,777	3,907	518	958	2,937	266	955	1,726

Continued

Table 36.--Supply and utilization of food by subregion, average 1959-61--Continued

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
-----1,000 metric tons-----										
Other South America										
Production.....	1,574	1,384	2,980	12,238	581	2,550	5,239	249	5,785	4,225
Imports.....	1,341	98	186	62	38	228	129	120	58	703
Exports.....	2	138	31	1,474	91	835	87	0	107	0
Changes in stocks...	66	23	-8	0	1	-23	4	1	3	0
Nonfood use.....	301	111	1,020	2,802	40	12	797	0	3,756	1,968
Supply for food.....	2,546	1,210	2,123	8,024	487	1,954	4,480	368	1,977	2,960
North Africa										
Production.....	4,144	1,421	9,430	1,170	1,521	460	11,958	545	1,828	6,238
Imports.....	2,558	21	308	284	89	889	93	157	40	380
Exports.....	230	381	381	237	214	55	981	63	85	3
Changes in stocks...	-26	10	-318	0	0	28	4	1	0	0
Nonfood use.....	483	186	1,701	130	320	0	4,154	111	13	1,450
Supply for food	6,015	865	7,974	1,087	1,076	1,266	6,912	527	1,770	5,165
West Central Africa										
Production.....	22	2,104	10,189	57,974	3,671	151	4,230	1,578	1,765	810
Imports.....	454	439	76	24	21	313	49	13	175	108
Exports.....	19	7	147	520	1,579	42	15	598	308	0
Nonfood use.....	4	219	1,767	11,082	622	0	768	0	40	81
Supply for food.....	453	2,317	8,351	46,396	1,491	422	3,496	993	1,592	837
East Africa										
Production.....	151	1,439	8,181	6,755	846	1,133	1,336	146	1,149	2,396
Imports.....	260	213	122	14	29	154	37	45	23	108
Exports.....	52	47	176	61	104	824	36	10	44	0
Nonfood use.....	10	84	1,064	1,128	87	2	149	12	47	447
Supply for food.....	349	1,521	7,063	5,580	684	461	1,188	169	1,081	2,057
West Asia										
Production.....	12,660	808	9,212	2,132	1,050	931	19,687	635	1,687	7,579
Imports.....	2,097	501	579	91	72	1,004	259	158	45	147
Exports.....	194	5	195	89	141	194	1,167	21	37	2
Changes in stocks...	341	-42	-332	0	5	-52	-64	11	0	0
Nonfood use.....	3,549	86	7,913	464	95	0	7,419	128	4	1,986
Supply for food.....	10,673	1,260	2,015	1,670	881	1,793	11,424	633	1,691	5,738
India										
Production.....	10,393	49,926	22,285	10,432	15,427	7,547	19,427	1,991	3,325	20,942
Imports.....	3,614	727	122	0	0	6	0	91	16	186
Exports.....	0	0	0	0	21	125	0	88	30	0
Changes in stocks...	1,636	1,824	100	0	0	337	0	0	0	0
Nonfood use.....	1,341	3,658	2,775	1,349	2,805	0	0	434	0	0
Supply for food.....	11,030	45,171	19,532	9,083	12,601	7,091	19,427	1,560	3,311	21,128
Other South Asia										
Production.....	6,122	20,210	1,635	1,217	2,142	1,600	8,707	577	2,567	7,670
Imports.....	1,393	1,150	0	68	63	235	81	63	1	150
Exports.....	0	187	0	0	0	0	0	105	37	0
Changes in stocks...	0	0	0	0	0	6	0	0	0	0
Nonfood use.....	768	1,929	205	79	183	0	704	81	0	2,452
Supply for food.....	6,747	19,244	1,430	1,206	2,022	1,829	8,084	454	2,531	5,368

Continued

Table 36.--Supply and utilization of food by subregion, average 1959-61--Continued

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
-----1,000 metric tons-----										
Other East Asia										
Production.....	210	46,461	5,802	32,033	4,096	4,104	29,965	2,229	5,464	566
Imports.....	1,643	3,129	241	1	123	473	126	99	382	1,408
Exports.....	35	4,835	625	930	186	2,072	324	873	73	0
Changes in stocks...	-19	131	16	-4	-6	8	0	1	0	0
Nonfood use.....	121	3,036	660	7,585	142	0	1,000	208	52	0
Supply for food.....	1,716	41,588	4,742	23,523	3,897	2,497	28,767	1,246	5,721	1,974
Communist Asia										
Production.....	21,930	82,690	37,603	94,402	11,884	990	30,343	2,163	8,756	1,253
Imports.....	1,367	193	505	1	0	692	46	21	0	0
Exports.....	94	1,521	107	12	1,050	41	134	69	320	0
Changes in stocks...	-1,044	-4,175	0	0	0	0	0	0	0	0
Nonfood use.....	4,118	5,714	10,360	39,632	3,610	0	229	141	0	0
Supply for food.....	20,129	79,823	27,641	54,759	7,224	1,641	30,026	1,974	8,436	1,253
Total diet-deficit										
Production.....	57,230	207,223	109,441	224,600	41,775	28,911	134,293	10,243	33,197	53,950
Imports.....	15,619	7,041	2,258	612	506	4,000	916	910	852	3,394
Exports.....	627	7,130	1,713	4,913	3,462	12,528	2,999	1,834	1,067	5
Changes in stocks...	956	-2,227	-553	-4	0	444	-56	14	3	0
Nonfood use.....	10,704	15,087	27,891	65,068	7,938	27	15,525	1,115	3,914	9,133
Supply for food.....	60,562	194,274	82,648	155,235	30,881	19,912	116,741	8,190	29,065	48,206
World										
Production.....	221,461	232,468	430,417	501,796	55,238	59,402	291,190	29,104	120,786	334,800
Imports.....	39,806	9,436	26,416	3,154	3,557	19,224	18,111	7,100	6,940	8,541
Exports.....	41,414	9,387	25,746	8,767	4,823	18,684	13,836	5,666	7,923	6,138
Changes in stocks...	-633	-1,614	6,531	291	159	1,726	51	271	45	274
Nonfood use.....	52,105	17,116	299,781	224,408	12,908	348	50,432	4,799	12,643	137,093
Supply for food.....	168,381	217,015	124,775	271,484	40,905	57,868	244,982	25,468	107,115	199,836

1/ Based on published food balances for 52 countries (ERS Foreign 86, 87 and 88, August 1964) and preliminary unpublished food balances for 40 additional countries.

Table 37.--Supply and utilization of food by subregion, projected 1970

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vege- tables and fruits	Fats and oils	Meat, fish and eggs	Milk products
	- - - - -1,000 metric tons- - - - -									
Diet-adequate										
United States										
Production.....	41,737	3,277	160,433	14,511	2,005	3,473	30,417	7,847	29,353	59,152
Imports.....	136	20	519	45	600	6,500	3,496	148	1,413	342
Exports.....	21,800	2,167	19,660	259	300	49	2,291	3,040	567	458
Nonfood use.....	5,568	185	135,686	4,781	294	85	3,390	272	4,457	14,436
Supply for food.....	14,505	945	5,606	9,516	2,011	9,839	28,232	4,683	25,742	44,600
Canada										
Production.....	16,000	0	13,031	2,160	90	251	2,394	516	3,541	10,041
Imports.....	0	57	524	58	66	1,000	1,590	10	178	0
Exports.....	10,000	0	750	230	25	25	134	0	638	379
Nonfood use.....	4,230	0	12,596	528	22	9	628	21	424	5,468
Supply for food.....	1,770	57	209	1,460	109	1,217	3,222	505	2,657	4,194
Mexico										
Production.....	2,303	427	7,977	1,302	1,398	2,560	4,400	421	1,518	3,870
Imports.....	0	0	8	4	20	0	37	2	3	300
Exports.....	328	63	200	25	25	800	450	0	166	0
Nonfood use.....	227	58	1,979	237	317	41	417	0	4	466
Supply for food.....	1,748	306	5,806	1,044	1,076	1,719	3,570	423	1,351	3,704
Brazil										
Production.....	375	6,594	12,093	31,089	3,522	5,393	7,819	798	3,962	7,180
Imports.....	2,824	0	97	5	16	0	120	13	20	76
Exports.....	0	94	0	550	252	1,200	175	0	81	0
Nonfood use.....	110	700	8,516	7,634	385	0	650	0	50	960
Supply for food.....	3,089	5,800	3,674	22,910	2,901	4,193	7,114	811	3,851	6,296
River Plate										
Production.....	8,005	285	10,986	2,950	150	1,215	8,261	580	3,854	6,219
Imports.....	0	0	13	381	0	61	15	0	0	0
Exports.....	2,900	30	4,567	75	23	210	1,479	73	810	78
Nonfood use.....	1,255	41	6,095	780	38	0	3,350	0	1	3,650
Supply for food.....	3,850	214	337	2,476	89	1,066	3,447	507	3,043	2,491
Northern Europe										
Production.....	22,614	152	51,803	60,879	631	7,011	32,286	3,262	24,085	104,108
Imports.....	9,643	802	22,301	1,161	1,245	4,698	13,965	4,837	4,408	2,669
Exports.....	2,964	109	7,052	2,298	278	1,324	2,155	1,350	3,824	4,897
Nonfood use.....	10,614	156	64,121	37,401	341	291	9,116	1,313	1,589	55,049
Supply for food.....	18,679	689	2,931	22,341	1,257	10,094	34,980	5,436	23,080	46,831
Southern Europe										
Production.....	13,654	1,378	13,005	12,425	2,737	2,073	37,836	2,039	6,063	20,660
Imports.....	2,016	10	4,254	85	183	621	190	621	1,240	667
Exports.....	158	179	39	668	419	10	6,839	150	425	250
Nonfood use.....	1,863	66	15,965	3,840	1,105	4	5,120	327	94	6,918
Supply for food.....	13,649	1,143	1,255	8,002	1,396	2,680	26,067	2,183	6,784	14,159
Eastern Europe										
Production.....	20,200	220	45,000	76,700	900	5,300	24,700	2,600	7,500	38,000
Imports.....	5,500	580	3,200	0	20	100	1,300	360	500	40
Exports.....	200	60	1,800	200	100	1,500	2,000	200	700	40
Nonfood use.....	7,800	80	40,000	60,700	230	0	8,000	540	100	26,000
Supply for food.....	17,700	660	6,400	15,800	590	3,900	16,000	2,220	7,200	12,000

Continued

Table 37.--Supply and utilization of food by subregion, projected 1970--Continued

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
-----1,000 metric tons-----										
USSR										
Production.....	66,000	1,000	62,700	110,000	15,000	9,500	33,700	5,400	17,300	70,000
Imports.....	500	70	100	0	0	2,200	800	50	300	0
Exports.....	6,000	0	2,000	0	0	1,100	0	350	400	0
Changes in stocks...	2,300	0	1,500	0	0	300	0	0	0	0
Nonfood use.....	24,000	130	45,600	78,000	13,900	0	8,200	1,200	1,200	35,700
Supply for food.....	34,200	940	13,700	32,000	1,100	10,300	26,300	3,900	16,000	34,300
Southern Africa										
Production.....	938	11	7,809	452	192	2,000	2,417	248	1,580	3,459
Imports.....	450	98	12	6	3	52	21	85	8	2
Exports.....	0	0	2,731	12	55	1,138	682	103	139	23
Changes in stocks...	0	0	500	0	0	0	0	0	0	0
Nonfood use.....	106	1	1,958	116	27	0	174	83	66	1,365
Supply for food.....	1,282	108	2,632	330	113	914	1,582	147	1,383	2,073
Japan										
Production.....	1,920	16,154	2,425	12,371	943	431	18,534	485	11,610	5,537
Imports.....	3,070	0	4,454	0	3,177	1,658	215	962	235	726
Exports.....	100	0	0	8	166	20	188	271	650	0
Nonfood use.....	802	1,244	5,734	4,749	2,254	0	4,032	391	3,272	694
Supply for food.....	4,088	14,910	1,145	7,614	1,700	2,069	14,529	785	7,923	5,569
Oceania										
Production.....	9,320	179	4,115	863	42	2,287	3,209	568	3,549	13,986
Imports.....	0	6	5	13	43	173	101	69	49	40
Exports.....	6,638	138	1,223	15	22	1,602	512	295	1,331	1,226
Nonfood use.....	994	3	2,795	168	8	62	914	33	245	9,319
Supply for food.....	1,688	44	102	693	55	796	1,884	309	2,022	3,481
Total diet-adequate										
Production.....	203,066	29,677	391,377	325,702	27,610	41,494	205,973	24,764	113,915	342,212
Imports.....	24,139	1,643	35,487	1,758	5,373	17,063	21,850	7,157	8,354	4,862
Exports.....	51,088	2,840	40,022	4,340	1,665	8,978	16,905	5,832	9,731	7,351
Changes in stocks...	2,300	0	2,000	0	0	300	0	0	0	0
Nonfood use.....	57,569	2,664	341,045	198,934	18,921	492	43,991	4,180	11,502	160,025
Supply for food.....	116,248	25,816	43,797	124,186	12,397	48,787	166,927	21,909	101,036	179,698
Diet-deficit										
Central America & Caribbean										
Production.....	34	978	2,791	8,604	742	9,538	4,549	180	1,179	2,817
Imports.....	1,149	664	219	90	86	0	95	156	129	347
Exports.....	1	2	41	2,351	85	8,003	362	9	40	0
Nonfood use.....	11	74	557	1,204	45	12	382	0	2	879
Supply for food.....	1,171	1,566	2,412	5,139	698	1,523	3,900	327	1,266	2,285
Other South America										
Production.....	1,858	1,953	4,225	17,397	828	3,652	7,303	399	13,359	5,747
Imports.....	1,865	86	226	35	36	121	252	146	84	1,037
Exports.....	2	180	31	2,760	119	1,070	129	0	72	0
Nonfood use.....	301	160	1,501	3,485	54	19	959	0	10,252	2,530
Supply for food.....	3,420	1,699	2,919	11,187	691	2,684	6,467	545	3,119	4,254
North Africa										
Production.....	5,440	2,027	12,590	1,500	1,950	650	14,325	745	2,343	7,685
Imports.....	3,595	30	575	320	97	1,235	108	218	195	630
Exports.....	224	506	365	333	261	65	1,120	47	76	6
Nonfood use.....	742	289	2,580	170	370	0	4,015	158	15	1,510
Supply for food.....	8,069	1,262	10,220	1,317	1,416	1,820	9,298	758	2,447	6,799

Continued

Table 37.--Supply and utilization of food by subregion, projected 1970--Continued

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
-----1,000 metric tons-----										
West Central Africa										
Production.....	36	2,634	12,552	70,910	5,126	260	5,540	2,038	2,491	998
Imports.....	771	680	230	33	27	570	72	16	247	247
Exports.....	21	3	146	642	2,053	57	18	800	472	0
Nonfood use.....	5	274	1,943	13,215	1,090	0	962	0	41	102
Supply for food....	781	3,037	10,693	57,086	2,010	773	4,632	1,254	2,225	1,143
East Africa										
Production.....	184	1,885	10,748	7,797	1,364	2,310	1,777	202	1,685	2,863
Imports.....	549	239	76	18	22	111	10	60	40	118
Exports.....	50	44	312	55	196	1,666	28	12	71	0
Nonfood use.....	19	106	1,267	1,301	138	0	195	18	74	681
Supply for food....	664	1,974	9,245	6,459	1,052	755	1,564	232	1,580	2,300
West Asia										
Production.....	15,726	1,387	11,594	2,663	1,300	1,457	24,088	761	2,143	8,900
Imports.....	2,573	682	595	85	81	1,006	398	320	142	255
Exports.....	249	138	624	122	150	0	1,367	38	32	6
Nonfood use.....	4,138	124	9,041	565	163	0	8,434	174	7	1,008
Supply for food....	13,912	1,807	2,524	2,061	1,068	2,463	14,685	869	2,246	8,141
India										
Production.....	13,907	63,754	26,074	13,319	19,960	11,652	27,188	2,769	4,072	28,505
Imports.....	5,000	803	516	1	0	0	75	146	62	231
Exports.....	0	0	0	43	91	896	248	40	11	0
Nonfood use.....	1,817	4,732	3,208	1,873	3,263	0	880	741	0	0
Supply for food....	17,090	59,825	23,382	11,404	16,606	10,756	26,135	2,134	4,123	28,736
Other South Asia										
Production.....	7,647	26,456	1,862	1,388	2,756	2,254	12,629	871	3,011	8,906
Imports.....	2,841	1,954	0	141	60	380	191	155	2	453
Exports.....	0	303	0	0	1	0	1	202	16	0
Nonfood use.....	805	3,172	228	83	241	0	1,600	127	0	2,547
Supply for food....	9,683	24,935	1,634	1,446	2,574	2,634	11,219	697	2,997	6,812
Other East Asia										
Production.....	290	59,697	9,134	42,055	5,255	5,330	38,846	3,362	7,574	753
Imports.....	2,294	3,069	358	1	179	626	219	161	431	2,071
Exports.....	45	5,300	1,110	797	269	2,457	602	1,387	110	10
Nonfood use.....	160	4,223	1,431	10,373	182	0	1,248	337	78	0
Supply for food....	2,379	53,243	6,951	30,886	4,983	3,499	37,215	1,799	7,817	2,814
Communist Asia										
Production.....	27,642	109,073	45,501	124,478	19,435	1,285	60,999	3,758	17,486	1,610
Imports.....	3,243	238	597	1	0	938	55	71	0	0
Exports.....	112	1,450	138	18	1,670	55	180	110	649	0
Nonfood use.....	5,179	7,177	9,856	52,273	6,063	0	295	754	0	0
Supply for food....	25,594	100,684	36,104	72,188	11,702	2,168	60,579	2,965	16,837	1,610
Total diet-deficit										
Production.....	72,764	269,844	137,071	290,111	58,716	38,388	197,244	15,085	55,343	68,784
Imports.....	23,880	8,445	3,392	725	588	4,987	1,475	1,449	1,332	5,389
Exports.....	704	7,926	2,767	7,121	4,895	14,269	4,055	2,645	1,549	22
Nonfood use.....	13,177	20,331	31,612	84,542	11,609	31	18,970	2,309	10,469	9,257
Supply for food....	82,763	250,032	106,084	199,173	42,800	29,075	175,694	11,580	44,657	64,894

Continued

Table 37.--Supply and utilization of food by subregion, projected 1970--Continued

Subregion	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat, fish and eggs	Milk products
	-----1,000 metric tons-----									
World										
Production.....	275,830	299,521	528,448	615,813	86,326	79,882	403,217	39,849	169,258	410,996
Imports.....	48,019	10,088	38,879	2,483	5,961	22,050	23,325	8,606	9,686	10,251
Exports.....	51,792	10,766	42,789	11,461	6,560	23,247	20,960	8,477	11,280	7,373
Changes in stocks...	2,300	0	2,000	0	0	300	0	0	0	0
Nonfood use.....	70,746	22,995	372,657	283,476	30,530	523	62,961	6,489	21,971	169,282
Supply for food.....	199,011	275,848	149,881	323,359	55,197	77,862	342,621	33,489	145,693	244,592

Table 38.--Population, and intake of calories, protein and fat, per person per day, by subregion and country, average 1959-61 and projected 1970

Subregion and country	Population		Calories		Protein						Fat	
					Total		Animal		Pulse			
	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970
	Mil.	Mil.	No.	No.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.
<u>Western Hemisphere</u>												
United States.....	179.9	208.0	3,190	3,180	95.3	95.5	63.8	64.9	4.8	4.7	146.3	147.8
Canada.....	17.9	22.9	3,100	3,070	95.6	95.3	64.3	66.4	2.5	2.2	140.4	143.0
Mexico.....	34.9	47.4	2,580	2,650	67.8	69.5	17.2	18.2	12.5	13.4	60.2	61.8
Central America & Caribbean												
British Honduras.....	0.1	0.1	2,020	2,150	52.9	53.5	14.0	14.9	4.4	4.6	52.5	55.8
Costa Rica.....	1.2	1.7	2,520	2,650	63.1	65.7	25.6	27.1	6.7	6.9	63.8	69.0
Cuba.....	6.8	8.4	2,730	2,440	60.6	56.1	27.1	24.0	7.3	6.4	78.4	59.6
Dominican Republic.....	3.0	4.3	2,020	2,080	41.1	42.3	11.9	12.3	6.6	7.0	47.8	48.5
El Salvador.....	2.4	3.2	2,000	2,210	53.8	58.3	16.7	17.3	5.5	6.6	47.2	51.5
Guatemala.....	3.8	5.1	1,970	2,060	50.0	51.3	9.0	9.4	4.3	4.5	34.7	36.8
Haiti.....	4.2	5.1	1,780	1,780	45.8	45.6	6.8	7.1	14.6	14.8	33.9	34.6
Honduras.....	1.8	2.5	2,330	2,450	61.1	63.2	13.7	14.3	6.2	6.5	40.4	43.3
Jamaica.....	1.6	1.9	2,270	2,600	57.9	66.7	19.3	22.8	3.3	4.0	53.9	64.4
Nicaragua.....	1.5	2.1	2,190	2,260	62.1	66.2	24.5	30.1	7.0	7.3	55.7	60.5
Panama.....	1.1	1.4	2,370	2,570	55.2	61.3	17.5	21.7	3.6	3.8	41.6	50.2
Trinidad & Tobago.....	0.8	1.1	2,470	2,700	62.7	69.3	19.7	23.5	7.7	8.5	61.5	74.0
Total and average 1/.....	32.3	42.0	2,240	2,260	54.2	55.2	17.0	17.4	7.3	7.3	52.4	50.7
Brazil.....	70.6	95.7	2,710	2,840	65.0	67.4	20.4	21.5	13.9	14.5	52.1	57.2
River Plate												
Argentina.....	19.9	23.6	3,220	3,220	101.3	102.6	52.6	54.8	1.9	1.9	114.9	118.4
Uruguay.....	2.8	3.5	3,030	3,070	98.6	99.0	66.5	68.3	1.3	1.3	132.2	138.2
Total and average.....	22.8	27.0	3,200	3,200	101.0	102.1	54.3	56.5	1.8	1.8	117.1	120.9
Other South America												
Bolivia.....	3.8	4.8	2,010	2,120	56.1	59.4	14.8	16.7	3.6	3.8	39.6	43.8
Chile.....	7.6	9.5	2,610	2,680	73.4	74.9	28.1	28.7	8.9	9.2	67.6	70.6
Colombia.....	14.8	19.5	2,280	2,470	53.0	58.6	22.5	26.6	4.5	4.7	50.8	57.4
Ecuador.....	4.3	5.9	2,100	2,210	53.3	57.2	17.4	19.5	6.4	6.4	38.6	42.7
Paraguay.....	1.7	2.2	2,400	2,460	66.6	69.5	28.8	31.1	6.6	6.7	55.7	59.4
Peru.....	11.1	13.9	2,060	2,240	51.0	57.6	12.6	16.4	5.2	6.1	38.2	44.3
Venezuela.....	7.4	10.8	2,330	2,510	60.4	66.0	24.3	28.1	7.4	7.7	63.5	72.5
Total and average.....	51.5	67.8	2,260	2,410	57.3	62.0	20.6	23.7	5.9	6.2	50.8	56.8
<u>Europe</u>												
Northern Europe												
Austria.....	7.1	7.2	2,960	3,060	86.7	87.0	46.6	50.1	1.3	1.3	110.1	123.5
Belgium-Luxembourg.....	9.5	10.0	2,960	3,010	86.8	87.1	46.3	50.3	1.6	1.9	123.4	138.2
Denmark.....	4.6	4.9	3,380	3,370	92.5	94.1	57.8	62.9	2.2	2.2	160.2	168.4
Finland.....	4.5	4.9	3,110	3,130	93.9	93.8	53.5	56.5	1.0	1.2	112.0	122.5
France.....	45.8	49.6	2,980	3,020	103.0	107.3	59.4	69.2	2.9	2.7	117.4	132.5
Germany (West).....	55.9	59.5	2,940	2,960	79.4	81.8	47.9	53.5	1.2	1.6	126.3	137.4
Ireland.....	2.8	2.8	3,460	3,470	90.8	92.8	53.7	60.6	1.1	1.1	130.6	144.1
Netherlands.....	11.6	12.8	3,000	3,040	80.0	77.4	45.2	46.6	1.7	1.7	129.3	142.5
Norway.....	3.6	3.9	2,950	2,900	82.0	81.1	48.2	50.1	1.6	1.9	128.4	129.0
Sweden.....	7.6	7.9	2,940	2,930	82.1	80.3	54.2	55.1	1.3	1.3	132.9	142.9
Switzerland.....	5.4	5.8	3,210	3,290	90.7	92.0	51.0	55.1	2.2	2.6	128.7	143.9
United Kingdom.....	52.6	56.7	3,260	3,270	88.2	89.8	52.6	57.6	3.1	2.9	142.5	152.3
Total and average.....	211.3	226.4	3,060	3,090	88.4	90.4	52.0	57.7	2.1	2.2	128.7	140.6
Southern Europe												
Greece.....	8.3	9.2	2,960	3,030	95.8	101.6	29.1	39.7	8.1	8.4	85.9	101.8
Italy.....	49.5	52.4	2,710	2,860	79.0	86.1	28.9	40.0	4.3	4.1	78.8	97.4
Portugal.....	8.4	9.4	2,490	2,560	72.4	74.8	27.4	29.4	4.1	4.6	70.3	72.1
Spain.....	30.3	33.0	2,740	2,910	74.7	80.4	21.5	28.7	7.0	7.0	84.5	102.1
Total and average.....	97.0	104.4	2,720	2,870	78.5	84.6	26.5	35.4	5.5	5.4	80.5	97.0

Continued

Table 38.--Population, and intake of calories, protein and fat, per person per day, by subregion and country, average 1959-61 and projected 1970--Continued

Subregion and country	Population		Calories		Protein						Fat	
	1959-61		1959-61		Total		Animal		Pulse		1959-61	
	Mil.	Mil.	No.	No.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.
Eastern Europe												
Bulgaria.....	7.9	8.6	2,930	2,990	81.6	81.1	16.4	16.5	3.8	3.7	60.1	68.7
Czechoslovakia.....	13.6	14.6	3,080	3,030	71.6	69.7	33.5	32.9	1.3	1.5	107.1	106.6
Germany (East).....	17.2	17.5	3,010	3,040	70.1	70.7	31.7	33.4	0.8	0.6	129.7	133.7
Hungary.....	10.0	10.2	2,950	2,990	70.6	71.1	30.7	33.5	1.4	2.4	96.6	108.5
Poland.....	29.6	33.3	3,100	3,120	78.0	78.1	34.4	34.2	0.8	0.9	92.4	92.5
Rumania.....	18.4	20.2	2,900	2,950	82.2	81.7	20.7	23.8	3.7	4.3	66.0	74.8
Yugoslavia.....	18.4	20.8	2,900	3,020	82.7	85.7	22.2	25.4	5.5	6.4	66.3	79.0
Total and average.....	116.8	127.4	3,000	3,030	77.3	77.4	28.0	29.4	2.4	2.7	88.5	94.6
USSR.....	214.2	244.6	3,040	3,170	86.7	89.5	29.5	36.2	2.7	2.7	66.7	83.3
Africa & West Asia												
North Africa												
Algeria.....	11.0	12.8	2,350	2,470	63.7	65.7	12.6	13.2	3.3	3.1	46.1	50.1
Ethiopia.....	18.8	21.8	2,090	2,180	70.0	73.3	25.6	28.1	13.8	14.2	31.4	37.8
Libya.....	1.2	1.4	2,320	2,460	57.5	60.8	9.4	10.5	3.4	3.5	52.5	55.3
Morocco.....	11.6	15.8	2,210	2,380	66.6	70.9	15.6	16.4	5.6	5.6	45.0	50.0
Sudan.....	11.8	15.6	2,160	2,310	72.2	76.1	20.8	23.3	9.1	10.9	57.3	65.0
Tunisia.....	4.2	4.8	1,900	2,220	50.9	59.8	9.8	11.0	3.2	3.3	46.7	51.9
UAR (Egypt).....	25.9	32.9	2,300	2,330	70.2	71.8	12.9	13.6	5.5	5.7	33.8	35.1
Total and average.....	84.8	105.4	2,210	2,320	68.0	71.2	17.0	18.2	7.4	7.8	40.6	45.2
West Central Africa												
Angola.....	4.6	5.2	2,310	2,450	61.8	67.3	11.9	14.6	16.3	17.6	47.1	51.1
Cameroon.....	4.1	4.5	2,470	2,540	55.3	57.8	7.9	9.1	8.5	9.1	56.7	58.8
Congo (L).....	19.0	24.0	2,460	2,570	44.0	47.7	4.2	4.6	15.0	15.9	41.7	43.5
Ghana.....	6.7	8.6	2,480	2,620	51.2	55.4	7.0	9.3	5.9	6.5	41.2	43.9
Guinea.....	3.0	4.1	2,400	2,460	46.3	48.9	3.4	3.9	4.7	7.8	49.1	51.4
Ivory Coast.....	3.3	4.1	2,610	2,740	52.7	55.8	6.3	7.2	4.4	4.7	36.7	38.9
Liberia.....	1.0	1.2	2,430	2,490	38.8	42.7	4.6	6.5	3.6	4.3	53.8	56.1
Nigeria.....	39.4	48.0	2,450	2,520	51.3	53.9	4.5	5.2	7.3	7.7	43.8	45.5
Sierra Leone.....	2.4	3.0	2,410	2,540	39.7	43.3	3.2	4.0	3.4	3.5	51.9	53.1
Togo.....	1.4	2.0	2,570	2,600	59.4	60.3	4.7	4.9	9.1	10.1	44.5	46.1
Total and average.....	108.8	134.3	2,460	2,530	51.8	54.4	5.7	6.4	8.8	9.3	45.6	47.3
East Africa												
Kenya.....	8.2	11.1	2,380	2,560	72.9	75.3	19.0	19.4	5.9	6.1	42.6	45.7
Malagasy Republic.....	5.4	7.0	2,480	2,550	51.8	54.0	10.7	11.4	5.7	7.0	27.6	30.4
Rhodesia-Nyasaland.....	9.1	12.0	2,380	2,420	72.7	78.2	12.9	17.4	8.8	11.2	37.4	40.9
Tanganyika.....	9.2	11.1	2,440	2,550	68.6	72.1	12.4	12.9	11.7	12.3	39.8	41.5
Total and average.....	48.6	61.1	2,390	2,490	65.2	68.7	11.5	12.9	8.9	10.2	37.4	39.7
Southern Africa												
South Africa, Rep.....	15.8	19.9	2,700	2,850	84.7	90.7	36.1	39.4	2.8	3.0	66.8	68.3
Total and average.....	17.6	22.0	2,670	2,810	83.9	89.7	35.3	38.4	2.8	3.2	66.5	68.0
West Asia												
Cyprus.....	0.6	0.7	2,630	2,760	72.8	78.5	17.5	20.4	6.2	6.4	64.7	69.8
Iran.....	20.6	26.1	2,120	2,190	59.6	61.4	10.0	11.4	3.6	3.3	34.0	36.6
Iraq.....	6.9	8.9	2,210	2,400	59.9	66.3	16.7	19.8	3.8	5.0	43.5	54.0
Israel.....	2.1	3.1	2,840	2,960	92.0	96.8	40.7	47.7	6.0	4.6	94.6	105.3
Jordan.....	1.6	2.1	2,200	2,320	66.0	69.1	10.5	12.0	4.8	5.0	43.6	46.7
Lebanon.....	1.6	2.1	2,480	2,600	68.4	72.9	13.9	17.5	3.5	3.6	64.0	65.9
Syria.....	4.6	6.5	2,300	2,340	77.9	79.8	20.0	21.2	8.2	8.5	44.8	45.1
Turkey.....	27.6	36.7	2,590	2,620	76.9	77.6	12.5	13.3	6.9	6.2	50.5	50.3
Total and average.....	79.4	101.0	2,350	2,430	69.1	71.6	13.1	14.9	5.2	5.2	45.5	48.2

Continued

Table 38.--Population, and intake of calories, protein and fat, per person per day, by subregion and country, average 1959061 and projected 1970--Continued

Subregion and country	Population		Calories		Protein						Fat	
					Total		Animal		Pulse			
	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970
	Mil.	Mil.	No.	No.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.
Far East												
India.....	431.7	536.6	2,060	2,220	55.6	59.2	7.2	7.8	14.4	15.2	30.3	32.7
Other South Asia												
Ceylon.....	9.9	13.0	2,120	2,200	47.3	48.2	12.2	13.3	5.7	5.5	46.8	50.1
Pakistan.....	92.6	120.6	2,120	2,230	55.7	60.8	10.9	10.2	6.2	6.0	27.2	29.1
Total and average.....	126.4	162.5	2,120	2,230	55.0	59.8	11.0	10.4	6.2	6.0	28.7	30.8
Japan.....	93.2	102.2	2,360	2,600	69.9	79.8	18.0	26.3	12.1	13.2	31.7	49.7
Other East Asia												
Burma.....	22.1	26.7	2,170	2,280	46.2	47.4	8.8	8.7	4.5	4.9	33.3	38.9
Indonesia.....	94.2	117.1	2,160	2,230	43.3	45.2	5.0	5.2	7.6	7.9	36.8	40.1
Malaya.....	6.9	9.4	2,400	2,500	53.7	57.5	14.0	16.2	5.6	6.0	41.6	44.0
Philippines.....	27.8	37.8	2,000	2,220	44.6	47.8	10.7	11.9	3.7	3.6	32.0	38.7
Taiwan.....	11.1	15.2	2,440	2,470	58.8	62.2	11.5	14.1	11.1	12.0	44.7	47.2
Thailand.....	27.0	35.2	2,120	2,350	45.0	48.7	9.1	10.0	4.5	4.8	31.7	35.0
Total and average.....	246.2	315.0	2,150	2,270	45.0	47.5	7.3	8.0	6.4	6.6	35.5	39.6
Oceania												
Australia.....	10.3	12.6	3,210	3,160	99.8	99.8	66.8	68.6	1.3	1.3	142.5	143.1
New Zealand.....	2.4	3.0	3,460	3,460	107.8	109.3	76.3	78.1	1.3	1.3	159.2	157.8
Total and average.....	12.7	15.5	3,260	3,220	101.3	101.6	68.6	70.4	1.3	1.3	145.7	145.9
Communist Asia												
Mainland China.....	685.7	811.6	1,790	2,030	47.5	55.5	3.2	5.4	7.3	10.1	19.7	27.7
Total and average.....	712.9	846.8	1,790	2,030	47.5	55.5	3.2	5.4	7.3	10.1	19.7	27.7

1/ Total and average (weighted by population) include estimates for other countries and territories in the subregion.

Table 39.--Nutritional deficits per person per day, by subregion and country, average 1959-61 and projected 1970

Subregion and country	Calories		Protein						Fat	
			Animal		Pulse		Other			
	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970
	No.	No.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.
Central America & Caribbean										
British Honduras.....	430	300	0	0	1.6	0.5	5.5	6.0	0	0
Costa Rica.....	0	0	0	0	0	0	0	0	0	0
Cuba.....	0	60	0	0	0	0	0	3.9	0	0
Dominican Republic.....	430	370	0	0	1.5	0.7	17.4	17.0	0	0
El Salvador.....	450	240	0	0	0	0	6.2	1.7	0	0
Guatemala.....	480	390	1.0	0.6	6.7	6.1	3.3	2.6	6.9	4.8
Haiti.....	670	670	3.2	2.9	0	0	11.0	11.3	7.7	7.0
Honduras.....	120	0	0	0	0.1	0	0	0	1.2	0
Jamaica.....	180	0	0	0	0	0	2.1	0	0	0
Nicaragua.....	260	190	0	0	0	0	0	0	0	0
Panama.....	80	0	0	0	0	0	4.8	0	0	0
Trinidad & Tobago.....	0	0	0	0	0	0	0	0	0	0
Weighted average 1/.....	250	210	0.5	0.4	0.9	0.8	4.2	4.3	1.9	1.4
Other South America										
Bolivia.....	490	380	0	0	1.6	0	2.3	0.6	2.8	0
Chile.....	0	0	0	0	0	0	0	0	0	0
Colombia.....	220	30	0	0	0	0	7.0	1.4	0	0
Ecuador.....	400	290	0	0	0	0	6.7	2.8	3.8	0
Paraguay.....	100	40	0	0	0	0	0	0	0	0
Peru.....	440	260	0	0	2.2	0	6.8	2.4	4.2	0
Venezuela.....	170	0	0	0	0	0	0	0	0	0
Weighted average.....	260	120	0	0	0.6	0	4.3	1.3	1.4	0
North Africa										
Algeria.....	0	0	0	0	4.1	3.7	0	0	0	0
Ethiopia.....	241	177	0	0	0	0	0	0	13.1	9.8
Libya.....	30	0	0.6	0	7.2	6.0	0	0	0	0
Morocco.....	140	0	0	0	0	0	0	0	0	0
Sudan.....	186	44	0	0	0	0	0	0	0	0
Tunisia.....	450	130	0.2	0	7.0	5.7	1.9	0	0	0
U.A.R.....	200	20	0	0	1.6	0.3	0	0	6.0	4.7
Weighted average.....	190	60	0.1	0	1.5	0.9	0.1	0	3.7	1.9
West Central Africa										
Angola.....	90	0	0	0	0	0	0	0	0	0
Cameroon.....	0	0	2.1	0.9	1.5	0.9	1.1	0.4	0	0
Congo (L).....	0	0	5.8	5.4	0	0	10.2	6.9	0	0
Ghana.....	0	0	3.0	0.7	4.1	3.5	1.7	0.4	0	0
Guinea.....	0	0	6.6	6.1	5.3	2.2	1.8	2.8	0	0
Ivory Coast.....	0	0	3.7	2.8	5.6	5.3	0	0	4.0	1.8
Liberia.....	0	0	5.4	3.5	6.4	5.7	9.4	8.1	0	0
Nigeria.....	0	0	5.4	4.8	2.7	2.3	0.6	0	0	0
Sierra Leone.....	0	0	6.8	6.0	6.6	6.5	6.9	4.2	0	0
Togo.....	0	0	5.3	5.1	0.9	0	0	0	0	0
Weighted average.....	0	0	4.4	3.8	2.4	2.0	2.4	1.5	0.1	0.1
East Africa										
Kenya.....	60	0	0	0	0	0	0	0	0	0
Malagasy Republic.....	0	0	0	0	3.6	1.6	5.6	4.4	14.0	11.2
Rhodesia & Nyasaland.....	70	80	0	0	0	0	0	0	4.2	0.7
Tanganyika.....	20	0	0	0	0	0	0	0	1.8	0.1
Weighted average.....	60	10	0.4	0.2	0.4	0.2	0.6	0.5	3.3	1.5

Continued

Table 39.--Nutritional deficits per person per day, by subregion and country,
average 1959-61 and projected 1970--Continued

Subregion and country	Calories		Protein						Fat	
			Animal		Pulse		Other			
	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970	1959-61	1970
	No.	No.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.
West Asia										
Cyprus.....	0	0	0	0	0	0	0	0	0	0
Iran.....	330	270	0	0	6.4	5.3	0	0	7.6	5.0
Iraq.....	240	50	0	0	0	0	0.1	0	0	0
Israel.....	0	0	0	0	0	0	0	0	0	0
Jordan.....	250	130	0	0	5.0	3.5	0	0	0	0
Lebanon.....	0	0	0	0	2.6	0	0	0	0	0
Syria.....	150	110	0	0	0	0	0	0	0	0
Turkey.....	0	0	0	0	0.6	0.5	0	0	0	0
Weighted average.....	160	100	0	0	2.9	2.1	0.1	0	2.8	1.7
India.....	240	80	2.8	2.2	0	0	1.6	0	8.7	6.3
Other South Asia										
Ceylon.....	180	100	0	0	4.3	4.5	8.4	7.3	0	0
Pakistan.....	180	70	0	0	2.9	3.8	1.4	0	11.8	9.9
Weighted average.....	180	70	0	0	0	3.9	2.0	0.6	10.8	9.1
Japan.....	0	0	0	0	0	0	0	0	8.2	0
Other East Asia										
Burma.....	180	70	1.2	1.3	5.5	5.1	7.1	6.2	6.6	1.0
Indonesia.....	190	120	5.0	4.8	2.4	2.1	9.3	7.9	3.1	0
Malaya.....	0	0	0	0	0.4	0	5.9	2.5	0	0
Philippines.....	350	130	0	0	5.6	4.5	9.8	7.7	7.9	1.2
Taiwan.....	0	0	0	0	0	0	1.2	0	0	0
Thailand.....	230	0	0.9	0	5.5	5.2	8.6	6.1	8.2	4.9
Weighted average.....	210	90	2.9	2.6	3.6	3.1	8.5	6.9	4.6	0.8
Communist Asia										
Mainland China.....	560	320	6.8	4.6	2.7	0	3.0	0	20.2	12.2
Weighted average.....	560	320	6.8	4.6	2.7	0	3.0	0	20.2	12.2
Diet-deficit subregions										
Weighted average.....	328	164	3.8	2.7	2.0	0.9	2.9	0.5	11.2	6.7

1/ Subregion averages include estimates for other countries and territories.

Table 40.--Magnitude of the food deficit by subregion, average 1959-61

Subregion	Food items to fill deficit								Cost <u>1/</u>
	Calories			Animal protein		Other protein		Fat	
	Wheat	Rice	Other grains	Nonfat dry or milk	Fish or protein	Dry beans and peas	or Soy-grits	Vegetable oil	
	----- <u>-1,000 metric tons-</u> -----								Million dollars
Central America and Caribbean.....	226	393	423	16	8	48	23	6	82.6
Other South America.....	716	423	571	0	0	51	24	0	120.6
North Africa.....	939	77	921	9	4	209	99	77	148.2
West Central Africa.....	0	33	26	485	224	429	203	4	120.3
East Africa.....	18	96	281	20	9	32	15	50	42.4
West Asia.....	1,211	157	169	0	0	379	179	61	141.7
India.....	2,283	8,202	3,668	1,226	566	0	0	1,198	1,660.2
Other South Asia.....	684	2,421	149	0	0	623	295	475	447.8
Other East Asia.....	333	6,661	523	724	334	1,457	689	360	1,023.6
Communist Asia.....	8,067	36,084	11,356	4,916	2,269	3,164	1,496	4,684	6,911.6
Total.....	14,477	54,547	18,087	7,396	3,414	6,392	3,023	6,915	10,699.0

1/ Includes wheat, rice, other grains, soygrits, nonfat dry milk and vegetable oil.
See Table 18 for prices of food items.

